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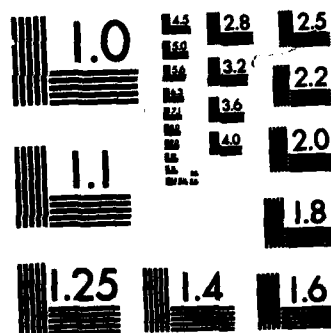
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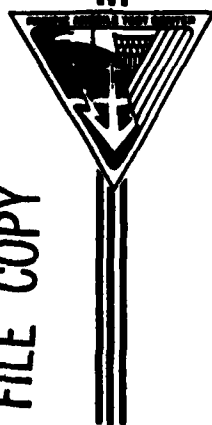
**TIDAL AND LUNAR DATA FOR
POINT MUGU, SAN NICOLAS ISLAND,
AND THE BARKING SANDS AREA
DURING 1983**

Compiled by

R. W. DIXON
Geophysics Division

30 December 1982

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PACIFIC MISSILE TEST CENTER

Point Mugu, California 93042

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AN ACTIVITY OF THE NAVAL AIR SYSTEMS COMMAND

Mr. J. S. Rosenthal, Head, Geophysical Sciences Branch; **CDR R. B. Glaes**, Geophysics Officer; **Mr. C. G. Elliott**, Project Manager; **Mr. P. D. Wilson**, Associate Head, Range Operations Department; and **Mr. W. L. Miller**, Associate Head, Range Directorate, have approved this report for publication.

K. I. LICHTI

Technical Director

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) → Basic lunar and tidal data for Point Mugu, San Nicolas Island, and the Barking Sands area during 1983 are provided. The data presented are (1) tidal data, (2) times of moonrise and moonset, and (3) times of lunar phases. ←		

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INTRODUCTION

This publication combines into a single source all tidal and lunar data for operational locations of the Pacific Missile Test Center for use in Calendar Year 1983.

The data presentations are in two main divisions: one for Point Mugu and San Nicolas Island, and the other for the Barking Sands area. Within each division, the times of moonrise and moonset and tidal data are given. An appendix provides information regarding lunar phases. Since all such data change from year to year, this publication will be reissued annually.

Sunrise-sunset times for these locations, and associated solar data which do not change significantly from year to year, are issued as a single, permanent publication. Further information regarding any of these data may be obtained from the Geophysics Division of the Range Operations Department.

DATA SOURCE AND TIME REFERENCES

The data given here have been prepared from information contained in Tide Tables for the West Coast of North and South America including the Hawaiian Islands, 1983.*

For Point Mugu and San Nicolas Island, all times listed are Pacific Standard Time (PST); add eight hours to obtain Greenwich Mean Time (GMT or Z).**

For the Barking Sands Area, all times listed are Alaska-Hawaii Standard Time (AHST); add ten hours to obtain GMT. Daylight Saving Time is not observed in Hawaii.



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*National Ocean Survey, Tide Tables for the West Coast of North and South America including the Hawaiian Islands, 1983. Washington, D.C., GPO, 1982.

**When Daylight Saving Time (PDT) is in effect, 1 hour is to be added to the times given. In 1983, Pacific Daylight Time is scheduled to commence at 0200 PST on Sunday, 24 April (add 1 hour), and to end at 0200 PDT on Sunday, 30 October (subtract 1 hour).

TIDAL DATA

The ranges of tidal heights that may be expected at Point Mugu and San Nicolas Island are shown in table 1. The range of heights for the primary harbor in the Barking Sands area, Port Allen, is shown in table 2. The times and heights of high and low tides for 1983 at Point Mugu are given in the even-numbered tables 4 through 26, and at San Nicolas Island in the odd-numbered tables 5 through 27. Similar tide data for Port Allen are given in tables 29 through 40.

Table 1. Tidal Ranges for Point Mugu and San Nicolas Island.

Tidal Levels	Point Mugu	San Nicolas Island
	Height (Feet)	Height (Feet)
Extreme high water	7.3	6.7
Mean higher high water	5.3	4.9
Mean high water	4.5	4.1
Mean tide level*	2.7	2.5
Mean low water	0.9	0.8
Mean lower low water	0.0	0.0
Extreme low water	-2.0	-1.8

*The mean tide level is also called mean sea level.

Table 2. Tidal Ranges for Port Allen.

Tidal Levels	Height (Feet)
Extreme high water	2.6
Mean higher high water	1.6
Mean high water	1.2
Mean tide level*	0.7
Mean low water	0.2
Mean lower low water	0.0
Extreme low water	-0.4

*The mean tide level is also called mean sea level.

Tidal graphs prepared from the Point Mugu data are presented in figures 1 through 12, and graphs prepared from the Port Allen tables are presented in figures 13 through 24. (Because of their close similarity to the Point Mugu graphs, graphical presentations of the San Nicolas Island data are not included in this publication.)

These tables list the times and heights of high and low tide for each month of the year and chronologically through each day. The heights are all measured from mean lower low water (see tables 1 and 2) and are values for a sea unaffected by wind waves or swell. The height and character of the sea surface are influenced by factors other than the predictable positions of the moon and sun, and is thus likely to be higher or lower than computed values may indicate. Information regarding the height of the tide at any time will be found in appendix A.

LUNAR DATA

Times of moonrise and moonset for the Point Mugu-San Nicolas Island area in 1983 are given in table 3, and for the Barking Sands area in table 28, preceding the tidal data for the respective stations. Information regarding the phases of the moon in 1983 will be found in appendix B.

Table 3. Moonrise and Moonset, Point Mugu, California, 1963.

Date	January		February		March		April		May		June		Date
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	
1	1949	0913	2200	0943	2045	0810	2237	0821	2314	0821	2358	0945	1
2	2100	0859	2303	1015	2149	0843	2336	0800	0811	0811	2358	1041	2
3	2208	1038	-----	1047	2251	0916	-----	0943	0003	1004	0030	1138	3
4	2312	1113	0004	1119	2351	0950	0031	1030	0046	1059	0100	1234	4
5	-----	1145	0103	1153	-----	1027	0122	1121	0124	1155	0128	1332	5
6	0014	1216	0201	1230	0050	1106	0208	1214	0158	1252	0157	1431	6
7	0114	1247	0258	1311	0146	1150	0249	1310	0230	1349	0227	1533	7
8	0212	1319	0352	1356	0239	1238	0326	1407	0300	1447	0259	1638	8
9	0310	1353	0443	1445	0327	1330	0359	1504	0329	1547	0336	1746	9
10	0408	1431	0530	1537	0411	1424	0430	1602	0358	1648	0419	1855	10
11	0503	1513	0613	1632	0451	1520	0500	1701	0429	1751	0510	2004	11
12	0557	1559	0651	1729	0526	1618	0529	1801	0504	1858	0509	2107	12
13	0647	1649	0725	1825	0559	1715	0559	1903	0543	2006	0715	2203	13
14	0732	1743	0757	1923	0629	1813	0631	2007	0629	2114	0825	2252	14
15	0813	1838	0827	2020	0659	1912	0707	2112	0722	2219	0936	2333	15
16	0850	1934	0856	2118	0728	2011	0748	2219	0823	2318	1045	-----	16
17	0924	2031	0925	2217	0758	2112	0835	2324	0929	-----	1151	0009	17
18	0955	2128	0956	2318	0831	2215	0930	-----	1038	0009	1256	0041	18
19	1024	2225	1030	-----	0908	2320	1031	0026	1146	0053	1358	0112	19
20	1053	2323	1109	0022	0950	-----	1137	0121	1253	0132	1500	0143	20
21	1123	-----	1153	0127	1039	0026	1246	0210	1358	0206	1601	0215	21
22	1155	0024	1246	0234	1136	0129	1354	0252	1502	0238	1702	0249	22
23	1232	0127	1347	0338	1239	0229	1502	0329	1605	0309	1801	0327	23
24	1314	0233	1455	0438	1348	0324	1608	0404	1707	0340	1858	0409	24
25	1404	0342	1607	0532	1458	0411	1712	0436	1809	0414	1950	0456	25
26	1503	0451	1720	0619	1608	0453	1816	0508	1910	0449	2038	0547	26
27	1609	0556	1831	0700	1717	0531	1920	0541	2009	0529	2120	0641	27
28	1721	0655	1939	0736	1824	0605	2022	0615	2105	0613	2157	0736	28
29	1835	0746	-----	-----	1929	0638	2123	0653	2156	0702	2231	0832	29
30	1946	0830	-----	-----	2033	0711	2220	0735	2242	0754	2301	0929	30
31	2055	0908	-----	-----	2136	0745	-----	-----	2322	0849	-----	-----	31

Date	July		August		September		October		November		December		Date
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	
1	2329	1025	2327	1206	-----	1411	0009	1457	0234	1533	0342	1510	1
2	2357	1121	-----	1308	0016	1514	0118	1543	0342	1605	0447	1544	2
3	-----	1218	0002	1413	0117	1613	0230	1624	0450	1638	0552	1622	3
4	0025	1317	0043	1520	0226	1705	0342	1701	0557	1712	0656	1706	4
5	0056	1419	0133	1627	0339	1751	0453	1735	0703	1748	0757	1753	5
6	0129	1524	0232	1731	0453	1831	0602	1809	0809	1829	0854	1845	6
7	0208	1632	0339	1828	0606	1907	0710	1842	0912	1914	0945	1941	7
8	0255	1741	0452	1918	0716	1941	0817	1917	1011	2004	1029	2038	8
9	0350	1848	0606	2001	0825	2014	0923	1956	1105	2057	1107	2135	9
10	0454	1950	0720	2038	0931	2048	1027	2038	1152	2153	1140	2232	10
11	0604	2043	0830	2113	1036	2124	1127	2124	1233	2250	1210	2327	11
12	0718	2128	0938	2145	1139	2203	1223	2215	1309	2346	1238	-----	12
13	0830	2208	1043	2218	1240	2246	1312	2309	1340	-----	1304	0023	13
14	0940	2242	1147	2251	1337	2333	1356	-----	1409	0043	1331	0119	14
15	1047	2315	1249	2327	1429	-----	1435	0004	1437	0139	1359	0217	15
16	1151	2346	1349	-----	1516	0024	1509	0101	1504	0236	1431	0317	16
17	1254	-----	1447	0008	1558	0118	1540	0158	1532	0333	1507	0420	17
18	1355	0018	1542	0050	1635	0213	1608	0254	1602	0433	1549	0526	18
19	1455	0051	1633	0138	1708	0310	1636	0351	1635	0534	1639	0634	19
20	1555	0127	1718	0230	1738	0407	1703	0448	1714	0639	1738	0740	20
21	1652	0208	1758	0324	1806	0503	1732	0546	1759	0746	1845	0841	21
22	1746	0253	1834	0420	1833	0559	1803	0646	1852	0852	1955	0936	22
23	1835	0342	1908	0517	1901	0658	1837	0748	1952	0954	2107	1022	23
24	1919	0435	1935	0613	1930	0754	1918	0852	2059	1051	2217	1102	24
25	1957	0530	2003	0709	2002	0854	2004	0957	2208	1141	2324	1138	25
26	2032	0626	2030	0805	2037	0956	2059	1101	2317	1224	-----	1210	26
27	2103	0722	2058	0901	2119	1059	2200	1200	-----	1301	0030	1241	27
28	2132	0818	2127	0959	2208	1203	2307	1254	0025	1335	0134	1312	28
29	2159	0914	2200	1059	2305	1305	-----	1341	0131	1407	0238	1345	29
30	2227	1010	2238	1202	-----	1404	0016	1422	0237	1438	0342	1421	30
31	2255	1107	2323	1306	-----	-----	0126	1459	-----	-----	0445	1501	31

TABLE 4
POINT MUGU TIDES
JANUARY 1983
31 DEC 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0348	2.1	0956	6.7	1719	4.1
2	0447	2.2	1045	6.2	1811	3.8
3	0550	4.2	0552	2.3	1141	3.5
4	0149	4.3	0716	2.3	1259	3.5
5	0245	4.5	0854	2.1	1409	3.6
6	0343	4.8	1027	1.6	1547	3.6
7	0433	5.1	1139	1.0	1723	3.6
8	0518	5.3	1238	0.5	1840	3.6
9	0558	5.5	1324	0.0	1939	3.6
10	0618	2.1	1324	5.7	1402	3.4
11	0656	2.2	0635	5.8	1436	3.5
12	0132	2.3	0708	5.9	1508	3.5
13	0204	2.3	0812	5.9	1538	3.6
14	0236	2.3	0844	5.8	1607	3.6
15	0308	2.3	0912	5.5	1639	3.6
16	0344	2.3	0944	5.2	1708	3.6
17	0423	2.4	1020	4.8	1740	3.6
18	0501	3.7	0505	2.4	1809	3.6
19	0550	3.8	0601	2.5	1846	3.6
20	0135	3.9	0714	2.4	1922	3.6
21	0221	4.1	0857	2.4	2008	3.6
22	0311	4.5	1030	1.5	2103	3.6
23	0403	4.9	1138	0.8	2219	3.6
24	0459	5.4	1234	0.1	2325	3.6
25	0547	5.9	1322	0.8	2355	3.6
26	0624	2.1	0639	6.4	2031	3.8
27	0116	1.9	0728	6.8	2113	3.8
28	0206	1.7	0813	7.0	2151	4.1
29	0256	1.5	0902	6.9	2233	4.1
30	0348	1.4	0948	6.5	2315	4.5
31	0441	1.4	1037	5.9	2358	4.6

x -- TIDE OCCURS ON NEXT DATE.

TABLE 5
SAN NICOLAS ISLAND TIDES
JANUARY 1983
33 DEC 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0358	1.9	1003	6.2	1729	-1.4	0002	3.82		
2	0457	3.9	1052	5.7	1821	-1.0	0112	3.8		
3	0557	3.9	0502	2.1	1148	5.0	1912	3.8		
4	0156	4.0	0726	2.1	1257	4.3	2004	3.8		
5	0252	4.2	0904	1.9	1416	3.5	2100	3.8		
6	0350	4.5	1037	1.5	1554	3.1	2154	3.8		
7	0440	4.7	1149	0.9	1730	3.0	2250	3.8		
8	0535	4.9	1248	0.5	1847	3.1	2343	3.8		
9	0605	5.1	1334	0.0	1946	3.1				
10	0628	1.9	0642	5.3	1412	-5.3	2031	3.2		
11	0142	2.0	0715	5.4	1446	-5.6	2107	3.3		
12	0214	2.1	0819	5.5	1518	-6.6	2141	3.3		
13	0246	2.1	0919	5.5	1617	-6.5	2210	3.4		
14	0318	2.1	1027	5.4	1718	-6.4	2242	3.4		
15	0354	2.1	1107	4.8	1819	-6.1	2314	3.4		
16	0433	2.2	1221	4.2	1919	-5.5	2346	3.4		
17	0511	3.5	0515	2.2	1100	4.5				
18	0557	3.6	0611	2.3	1141	3.9	1856	3.5		
19	0142	3.6	0724	1.9	1236	3.4	1932	3.5		
20	0228	3.8	0907	1.4	1403	2.9	2018	3.5		
21	0318	4.2	1040	1.4	1606	2.6	2113	3.5		
22	0410	4.6	1148	0.7	1754	2.7	2229	3.5		
23	0506	5.0	1244	0.1	1903	3.0	2335	3.5		
24	0554	5.5	1332	0.7	1954	3.3				
25	0634	1.9	0646	5.3	1417	-1.6	2038	3.5		
26	0126	1.5	0735	6.3	1500	-1.7	2120	3.8		
27	0216	1.4	0820	6.5	1625	-1.6	2158	4.0		
28	0306	1.4	0909	6.4	1705	-1.3	2232	4.1		
29	0358	1.3	0955	5.0	1746	-1.8	2322	4.2		
30	0451	1.3	1044	5.5			0005	4.3		

x -- TIDE OCCURS ON NEXT DATE.

POINT MUGU TIDES

JANUARY 1983

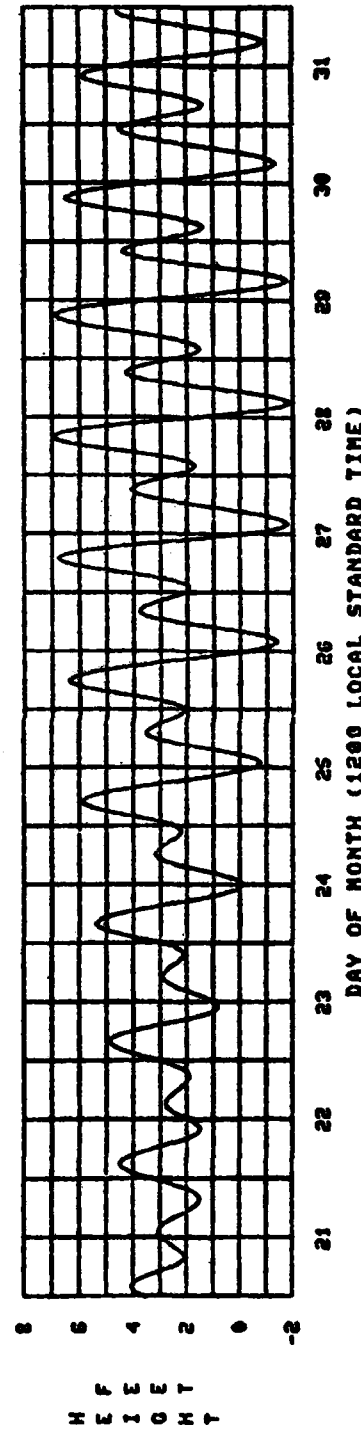
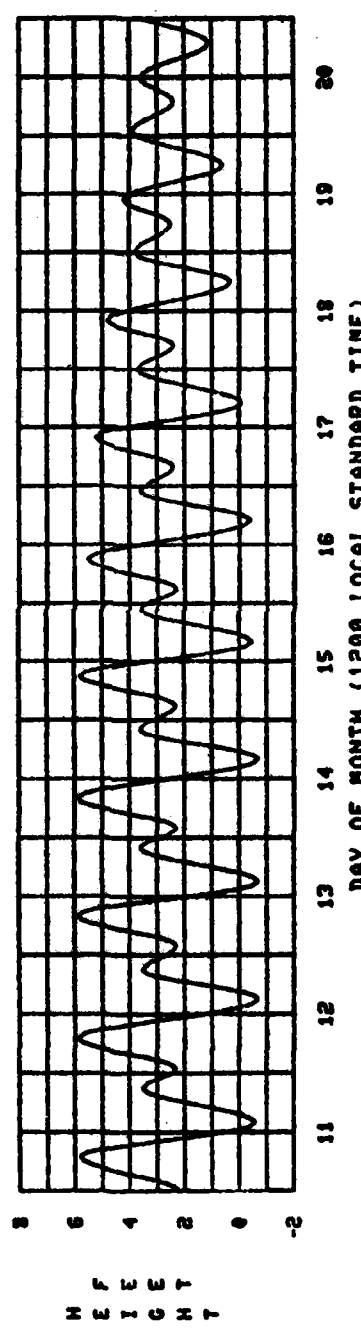
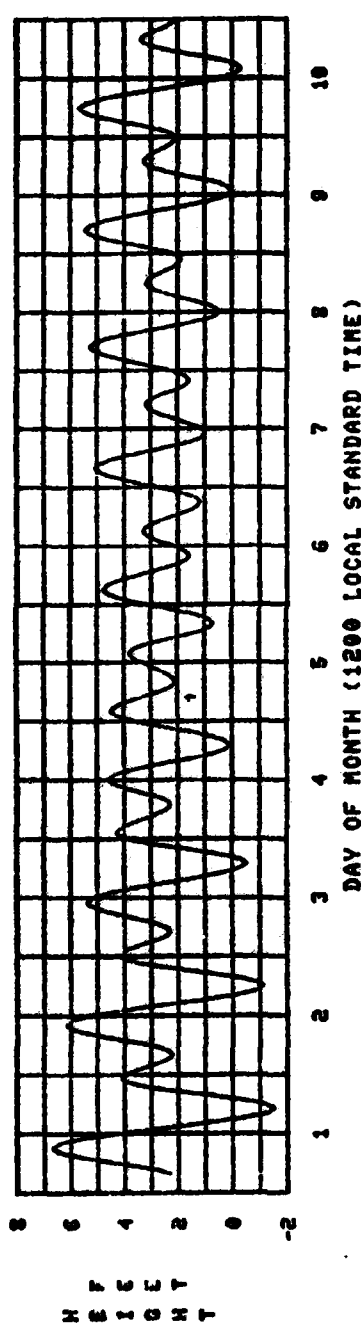


TABLE 6
POINT MUGU TIDES
FEBRUARY 1983
34 DEC 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0538	1.4	1129	5.1	1816	-2	1900	-.6
2	0646	4.6	0808	1.5	1826	4.2	1946	1.3
3	0135	4.6	0950	1.3	1830	3.4	2042	1.9
4	0233	4.6	1117	.9	1834	2.9	2154	2.3
5	0336	4.7	1223	.4	1842	2.8	2310	2.5
6	0436	4.8	1311	0.0	1844	3.1	---	---
7	0531	5.0	0617	5.2	1847	3.3	---	---
8	0610	2.5	0731	5.4	1847	3.3	2019	3.5
9	0652	2.4	0803	5.7	1848	3.3	2046	3.6
10	0129	2.2	0904	5.6	1851	3.8	2109	3.7
11	0201	2.0	1008	5.7	1852	3.9	2134	3.8
12	0233	1.9	1122	5.4	1857	4.1	2156	4.0
13	0305	1.7	1243	4.2	1900	4.2	2246	4.1
14	0340	1.6	0143	4.0	1904	4.2	2312	4.1
15	0412	1.6	0243	4.2	1907	4.2	2343	4.2
16	0454	1.6	0343	4.2	1910	4.2	---	---
17	0542	1.6	0443	4.0	1913	4.2	1819	1.4
18	0615	4.3	0543	4.0	1915	4.2	1858	1.9
19	0100	4.4	0645	1.5	1918	3.8	1958	1.9
20	0158	4.5	0807	1.4	1921	2.8	2004	2.3
21	0312	4.7	0954	1.0	1924	2.6	2150	2.5
22	0429	5.1	1120	-.3	1927	3.3	2320	2.4
23	0532	5.6	1219	-.9	1930	3.7	---	---
24	0629	2.1	1308	6.1	1933	3.7	2012	4.1
25	0119	1.6	0629	6.4	1936	3.7	2047	4.4
26	0206	1.2	0720	6.6	1939	3.7	2122	4.7
27	0252	.8	0808	6.6	1942	3.7	2157	4.9
28	0340	.6	0854	6.4	1945	3.7	2232	5.0
			0939	6.0	1948	3.7		

* -- TIDE OCCURS ON NEXT DATE.

TABLE 7
SAN NICOLAS ISLAND TIDES
FEBRUARY 1983
33 DEC 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0548	1.3	1136	4.7	1826	-2	1910	-.5
2	0653	4.3	0855	1.4	1833	3.9	1956	1.2
3	0142	4.3	0818	1.4	1837	3.2	2052	1.7
4	0240	4.3	1000	1.2	1841	2.7	2204	2.1
5	0343	4.4	1127	.8	1843	2.6	2320	2.3
6	0443	4.5	1233	.4	1843	2.9	---	---
7	0538	4.6	1321	0.0	1843	3.1	---	---
8	0620	2.3	0624	5.0	1843	3.3	2026	3.3
9	0102	2.2	0703	5.2	1843	3.3	2053	3.4
10	0139	2.0	0738	5.3	1843	3.3	2116	3.5
11	0211	1.8	0810	5.3	1843	3.3	2141	3.6
12	0243	1.7	0840	5.3	1843	3.3	2167	3.7
13	0315	1.5	0911	5.2	1843	3.3	2193	3.8
14	0350	1.5	0939	5.0	1843	3.3	2220	3.9
15	0422	1.5	1015	4.6	1843	3.3	2247	3.9
16	0504	1.5	1050	4.3	1843	3.3	---	---
17	0552	1.5	1129	3.7	1843	3.3	1829	1.3
18	0622	1.5	0817	1.4	1843	3.3	1908	1.7
19	0107	4.1	0857	1.3	1843	3.3	1968	2.1
20	0205	4.2	1004	.9	1843	3.3	2014	2.4
21	0319	4.7	1139	.4	1843	3.3	2036	2.2
22	0436	5.2	1223	-.3	1843	3.3	2054	2.2
23	0539	5.2	1313	-.3	1843	3.3	2071	2.2
24	0635	1.9	0635	5.6	1843	3.3	2088	2.2
25	0129	1.5	0727	5.9	1843	3.3	2105	2.2
26	0216	1.1	0815	6.1	1843	3.3	2122	2.2
27	0302	.7	0901	5.7	1843	3.3	2139	2.2
28	0350	.5	0945	5.6	1843	3.3	2156	2.2

* -- TIDE OCCURS ON NEXT DATE.

POINT MUGU TIDES

FEBRUARY 1983

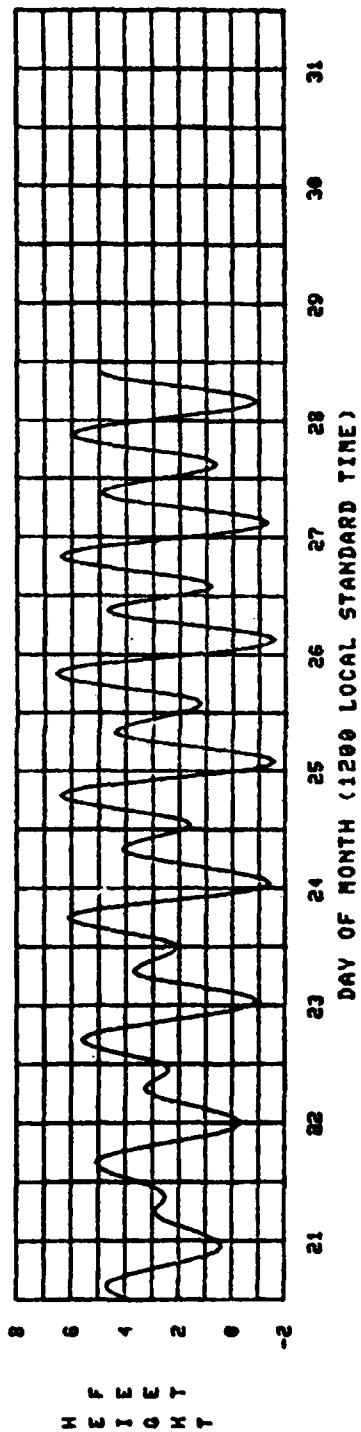
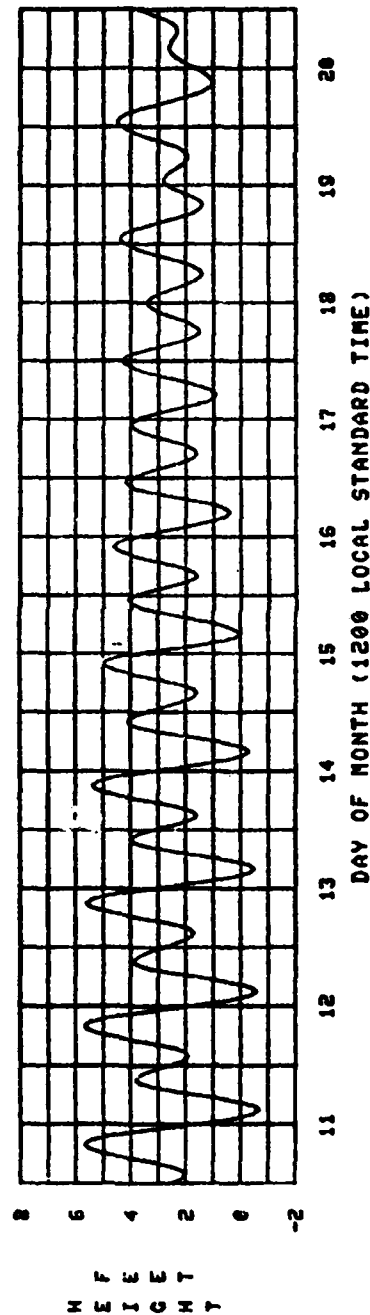
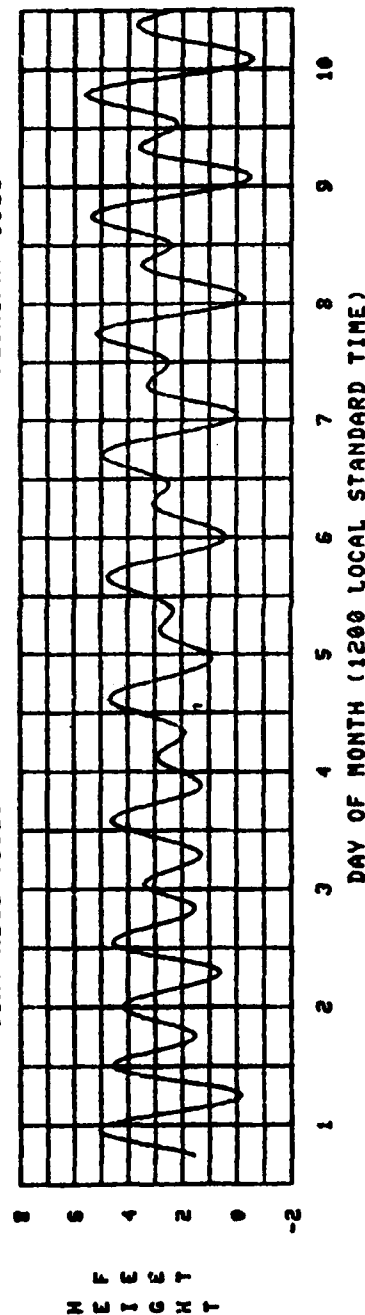


TABLE 8

POINT MUGU TIDES

MARCH 1983

34 DEG 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0428	.5	1026	5.4	1655	- .3	2308	5.0
2	0521	.6	1114	4.6	1729	.4	2346	4.9
3	0616	.7	1209	3.8	1804	1.1	---	---
4	0725	4.7	0725	.9	1319	3.1	1840	1.8
5	0826	4.5	0858	1.0	1529	2.7	1925	2.4
6	0917	4.3	1037	.8	1808	2.8	2112	2.7
7	0347	4.3	1154	.4	1903	3.2	2306	2.7
8	0502	4.4	1242	.1	1936	3.4	---	---
9	0610	2.5	0555	4.7	1319	- .2	1953	3.6
10	0750	2.2	0637	4.9	1353	- .3	2015	3.8
11	0922	1.9	0713	5.2	1417	- .4	2034	4.0
12	0154	1.6	0748	5.3	1442	- .5	2052	4.1
13	0223	1.3	0818	5.3	1504	- .4	2114	4.3
14	0255	1.0	0849	5.2	1529	- .2	2135	4.5
15	0327	.8	0922	5.0	1551	.1	2157	4.6
16	0402	.7	0957	4.6	1615	.4	2221	4.7
17	0442	.6	1036	4.2	1638	.8	2250	4.8
18	0529	.6	1126	3.6	1705	1.3	2322	4.8
19	0625	.5	1226	3.0	1734	1.8	---	---
20	0705	.4	0747	.6	1414	2.6	1812	2.3
21	0828	4.6	0925	.4	1705	2.8	1942	2.6
22	0933	4.5	1053	0.0	1807	3.2	2205	2.7
23	0410	4.8	1155	- .5	1845	3.6	2331	2.3
24	0523	5.2	1244	- .9	1914	4.1	---	---
25	0628	1.7	0622	5.6	1326	4.1	1946	4.5
26	0714	1.1	0714	5.8	1402	- .1	2015	4.8
27	0800	.5	0800	5.8	1438	- .9	2047	5.1
28	0845	- .1	0845	5.6	1511	- .5	2117	5.3
29	0931	- .2	0931	5.1	1543	- .1	2147	5.4
30	0415	- .3	1016	4.6	1612	1.5	2219	5.4
31	0501	- .2	1103	4.0	1643	1.1	2253	5.1

* --- TIDE OCCURS ON NEXT DATE.

TABLE 9

SAN NICOLAS ISLAND TIDES

MARCH 1983

33 DEG 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0438	.5	1033	5.0	1705	- .3	2315	4.6
2	0531	.5	1121	4.3	1739	.4	2353	4.6
3	0626	.6	1216	3.5	1814	1.0	---	---
4	0724	4.2	0935	.8	1326	2.9	1850	1.6
5	0820	4.0	0908	.9	1536	2.5	1935	2.2
6	0230	4.0	1047	.7	1815	2.6	2122	2.5
7	0354	4.0	1204	.4	1910	3.0	2316	2.5
8	0509	4.1	1252	.1	1943	3.2	---	---
9	0620	2.3	0602	4.4	1329	- .2	2000	3.4
10	0700	2.0	0644	4.6	1403	- .3	2022	3.5
11	0832	1.7	0720	4.8	1427	- .4	2041	3.7
12	0204	1.5	0755	4.9	1452	- .5	2059	3.8
13	0233	1.2	0825	4.8	1514	- .4	2121	4.0
14	0305	.9	0856	4.8	1539	- .2	2142	4.2
15	0412	.7	0929	4.6	1601	.1	2204	4.3
16	0422	.6	1004	4.3	1625	.4	2228	4.5
17	0452	.5	1043	3.9	1648	.7	2257	4.5
18	0539	.5	1133	2.4	1715	1.2	2329	---
19	0635	.5	1233	2.8	1744	1.6	---	---
20	0735	.4	0757	.5	1421	2.5	1822	2.1
21	0815	4.3	0935	.4	1712	2.6	1952	2.5
22	0245	4.3	1103	0.0	1814	3.0	2215	2.5
23	0417	4.5	1205	- .5	1852	3.4	2341	2.1
24	0530	4.8	1254	- .8	1921	3.8	---	---
25	0638	1.5	0629	5.2	1336	- .1	1953	4.2
26	0731	1.0	0721	5.4	1412	1.0	2022	4.5
27	0823	.5	0807	5.4	1448	.8	2054	4.7
28	0256	- .1	0852	5.2	1521	- .5	2124	4.9
29	0341	- .2	0938	4.3	1553	- .1	2154	5.0
30	0425	- .3	1023	3.7	1622	1.5	2226	5.0
31	0511	- .2	1110	3.7	1653	1.0	2300	4.7

* --- TIDE OCCURS ON NEXT DATE.

POINT MUGU TIDES

MARCH 1983

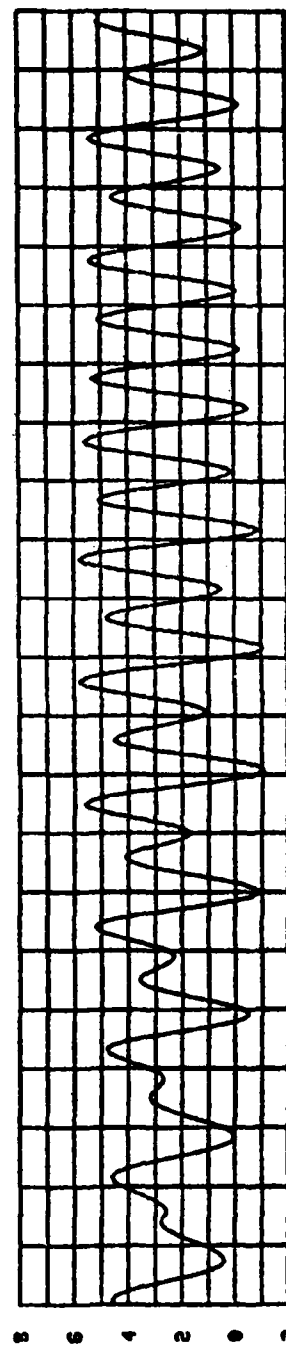
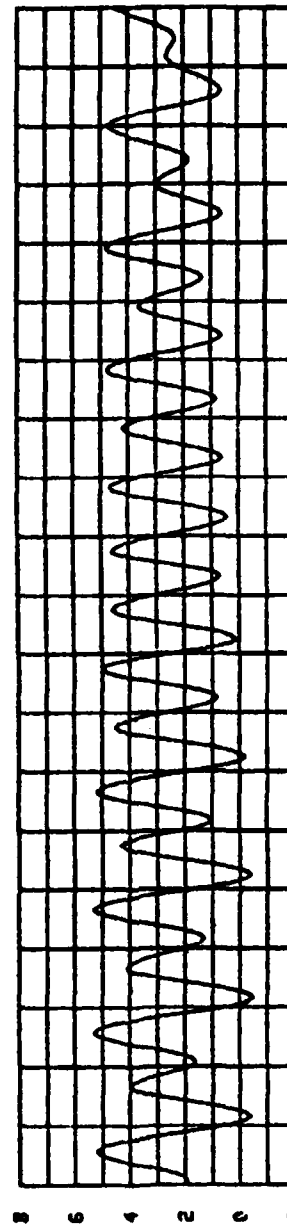
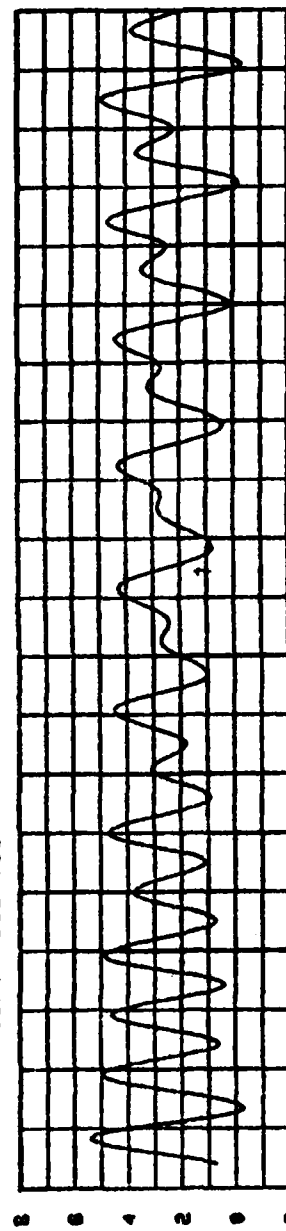


TABLE 10

POINT MUGU TIDES

APRIL 1983

34 DEC 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0550	.1	1159	3.4	1708	1.7	2325	4.8
2	0649	4.5	1319	2.9	1737	2.7	2354	2.5
3	0807	4.1	0806	.6	1542	2.3	2032	2.9
4	0103	4.1	0942	.6	1809	3.0	2256	2.8
5	0238	3.9	1101	.5	1838	3.3	2354	2.5
6	0417	3.9	1154	.3	1853	3.6		
7	0523	4.2	1234	.1	1914	3.8		
8	0633	2.1	0608	4.4	1305	0.0		
9	0105	1.6	0650	4.6	1332	0.0	1929	4.0
10	0137	1.1	0726	4.7	1358	0.0	1947	4.3
11	0208	.7	0801	4.7	1420	.1	2026	4.6
12	0240	.3	0836	4.6	1445	.3	2048	4.8
13	0316	0.0	0915	4.4	1507	.6	2113	5.1
14	0351	-2.2	0954	4.1	1536	1.0	2141	5.4
15	0436	-4	1044	3.7	1604	.4	2211	5.4
16	0524	-3	1140	3.3	1633	1.9	2248	5.3
17	0624	-2	1200	3.0	1708	2.3	2338	5.0
18	0739	-1	1456	2.9	1810	2.6		
19	0844	4.7	0903	-2	1641	3.2	2021	2.5
20	0219	4.5	1021	-2	1735	3.6	2221	2.5
21	0355	4.5	1123	-5	1807	4.1	2335	2.0
22	0511	4.7	1210	-6	1840	4.5		
23	0628	1.3	0613	4.9	1250	-5	1912	5.0
24	0116	.8	0706	4.8	1328	-3	1941	5.3
25	0200	0.0	0754	4.8	1403	0.0	2010	5.6
26	0240	-4	0841	1.6	1432	.4	2033	5.8
27	0322	-7	0927	4.3	1521	.9	2107	5.8
28	0404	-7	1011	3.9	1537	1.3	2136	5.6
29	0446	-8	1101	3.5	1557	1.2	2205	5.4
30	0527	-4	1159	3.3	1625	2.2	2237	5.0

± -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 11

SAN NICOLAS ISLAND TIDES

APRIL 1983

33 DEC 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0600	.1	1206	3.2	1718	1.5	2332	4.5		
2	0659	4.2	1326	2.7	1747	2.1	2332	4.5		
3	0814	3.8	0816	.5	1549	2.5	1816	2.5		
4	0110	3.6	0952	.5	1816	2.8	2042	2.7		
5	0245	3.6	1111	.3	1845	3.1	2306	2.6		
6	0424	3.9	1204	.1	1900	3.4	0604	2.3x		
7	0530	1.9	1244	4.1	1921	3.5				
8	0643	1.5	0615	4.3	1315	0.0	1936	3.7		
9	0115	1.0	0657	4.4	1342	0.0	1954	4.0		
10	0147	.6	0733	4.4	1408	.3	2013	4.3		
11	0218	.3	0808	4.3	1430	.5	2033	4.5		
12	0250	0.0	0843	4.1	1455	.9	2055	4.7		
13	0326	-2.2	0922	3.8	1517	1.3	2120	4.9		
14	0401	-4	1001	3.5	1546	1.7	2148	5.0		
15	0446	-3	1051	3.1	1614	2.1	2218	5.0		
16	0534	-2	1147	2.8	1643	2.5	2255	4.9		
17	0634	-1	1307	2.7	1718	3.0	2345	4.6		
18	0749	4.4	1393	-2	1820	3.4				
19	0851	4.2	0913	-3	1648	3.8	2031	2.7		
20	0226	4.2	1031	-5	1742	4.2	2231	2.4		
21	0402	4.4	1133	-5	1814	4.2	2345	1.8		
22	0518	1.2	1220	4.6	1847	4.5				
23	0638	0.0	0620	4.6	1900	4.9	1919	4.6		
24	0126	.5	0713	4.5	1938	5.2	1948	4.9		
25	0210	0.0	0801	4.3	2017	5.4	2017	5.4		
26	0250	-6	0848	4.0	2045	5.4	2045	5.4		
27	0332	-5	0934	3.6	2114	5.2	2114	5.2		
28	0414	-5	1018	3.0	2143	5.0	2143	5.0		
29	0456	-4	1106	3.0	2212	4.6	2212	4.6		
30	0537	-4	1206	3.0	2244	4.6	2244	4.6		

± -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES

APRIL 1983

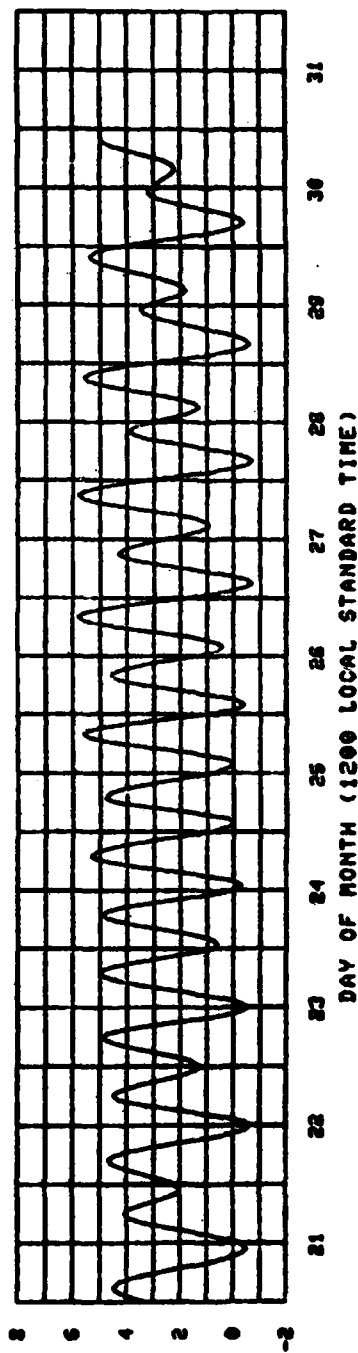
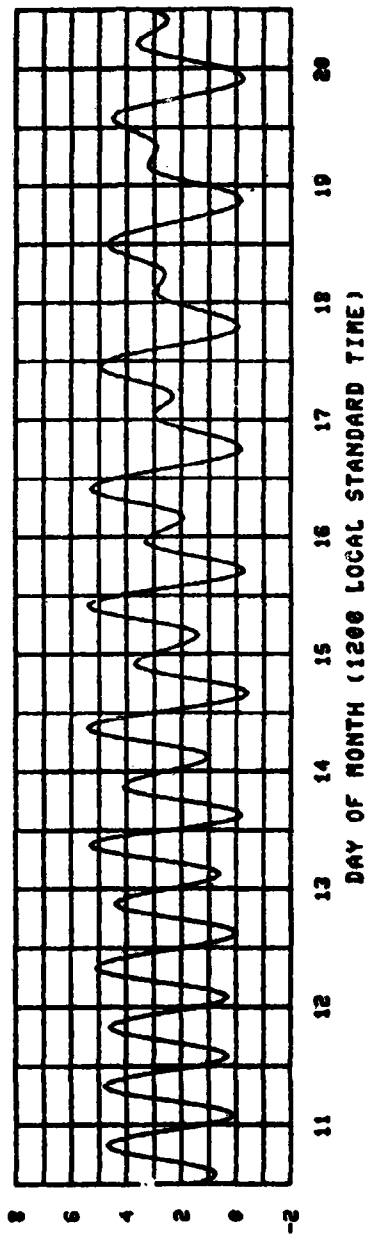
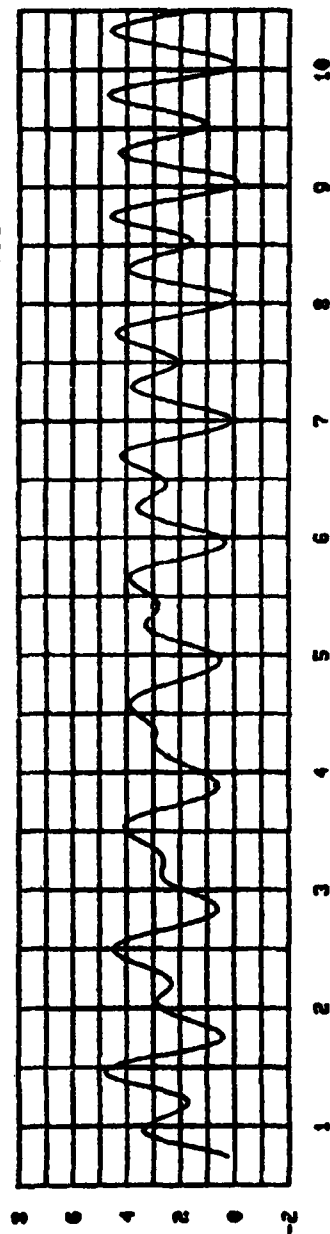


TABLE 12

POINT MUGU TIDES

MAY 1983

34 DEG 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0621	-1.1	1320	2.9	1654	4.6
2	0726	4.2	0841	4.1	1710	4.6
3	0802	3.8	0954	4.1	1735	3.1
4	0950	3.7	1050	4.1	1757	2.9
5	0305	3.7	1133	4.1	1817	2.5
6	0428	3.8	1207	4.1	1837	2.5
7	0529	3.8	0615	4.0	1855	2.0*
8	0642	1.4	0701	4.1	1917	4.7
9	0816	1.8	0743	4.1	1941	4.7
10	0950	3.3	0826	4.1	2008	5.0
11	0303	3.8	0910	4.0	2035	5.4
12	0345	3.8	0958	3.8	2112	5.9
13	0428	3.5	1054	3.3	2149	6.0
14	0520	3.3	1159	3.3	2235	5.7
15	0619	3.3	1318	3.3	2329	5.4
16	0725	3.4	1444	3.4	2377	2.7
17	0839	4.9	0943	3.7	2418	2.7
18	0943	4.5	1040	4.2	2430	1.6
19	0337	4.3	1131	4.6	2430	1.6
20	0459	4.2	1214	5.1	2435	1.6
21	0625	4.9	1303	5.1	2435	1.6
22	0811	4.2	1350	5.1	2435	1.6
23	0956	3.7	1428	5.1	2435	1.6
24	0314	3.8	1507	5.1	2435	1.6
25	0352	3.7	1557	5.1	2435	1.6
26	0431	3.5	1636	5.1	2435	1.6
27	0513	3.2	1720	5.1	2435	1.6
28	0555	3.1				
29	0648	3.2				
30						
31						

* -- TIDE OCCURS ON NEXT DATE.

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 13

SAN NICOLAS ISLAND TIDES

MAY 1983

33 DEG 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0631	-1.1	1327	2.7	1704	4.3
2	0736	3.9	0851	4.1	1717	2.9
3	0809	3.5	1004	4.1	1742	2.7
4	0932	3.5	1100	4.1	1804	2.3
5	0312	3.5	1143	4.1	1824	2.3
6	0435	3.5	1217	4.1	1844	1.8*
7	0536	3.5	0622	3.7	1244	4.0
8	0652	1.3	0708	3.8	1313	4.4
9	0826	3.3	0750	3.8	1341	4.6
10	0234	3.8	0833	3.8	1409	5.0
11	0313	3.7	0917	3.7	1441	5.3
12	0355	3.5	1005	3.5	1513	5.5
13	0438	3.3	1101	3.3	1549	5.6
14	0530	3.1	1206	3.1	1631	5.3
15	0629	2.8	1325	2.8	1726	5.0
16	0735	4.6	1451	3.2	1853	2.5
17	0846	4.2	0953	3.5	1947	2.1
18	0214	4.0	1050	3.9	2017	2.1
19	0344	3.9	1141	3.8	2047	1.5
20	0506	3.8	1224	3.7	2119	1.5
21	0635	3.7	1300	3.7	2156	5.0
22	0801	3.5	1334	3.5	2242	5.0
23	0948	3.5	1406	3.5	2336	2.5
24	0324	3.5	1438	3.5	2336	2.5
25	0402	3.2	1507	3.2	2336	2.5
26	0441	3.0	1575	3.0	2336	2.5
27	0523	2.9	1607	2.9	2336	2.5
28	0605	2.8	1646	2.8	2336	2.8
29	0658	2.8	1739	2.8	2336	2.8
30						
31						

* -- TIDE OCCURS ON NEXT DATE.

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES

MAY 1983

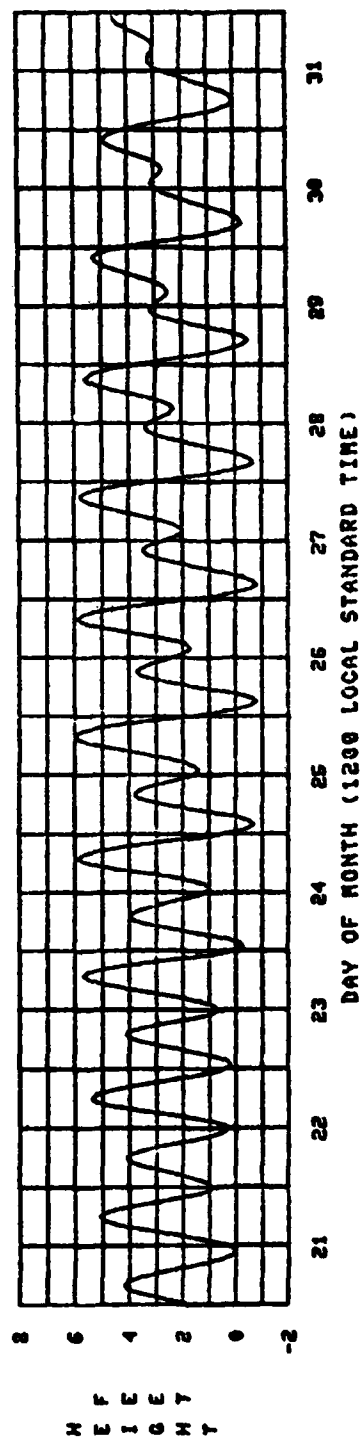
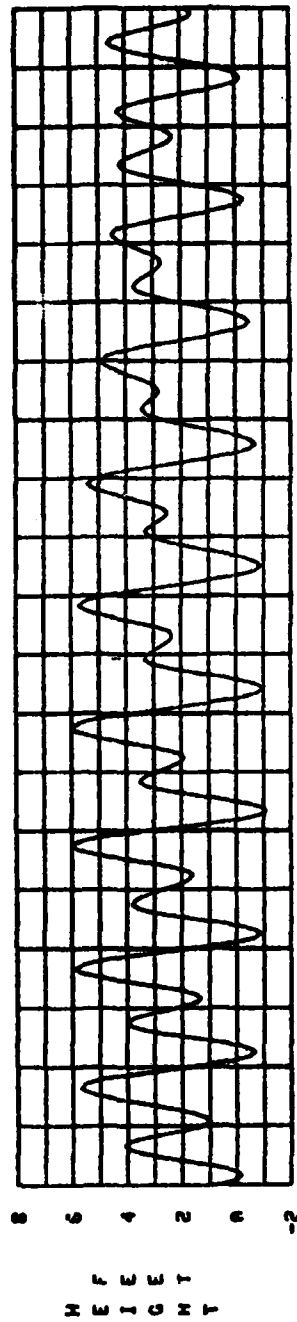
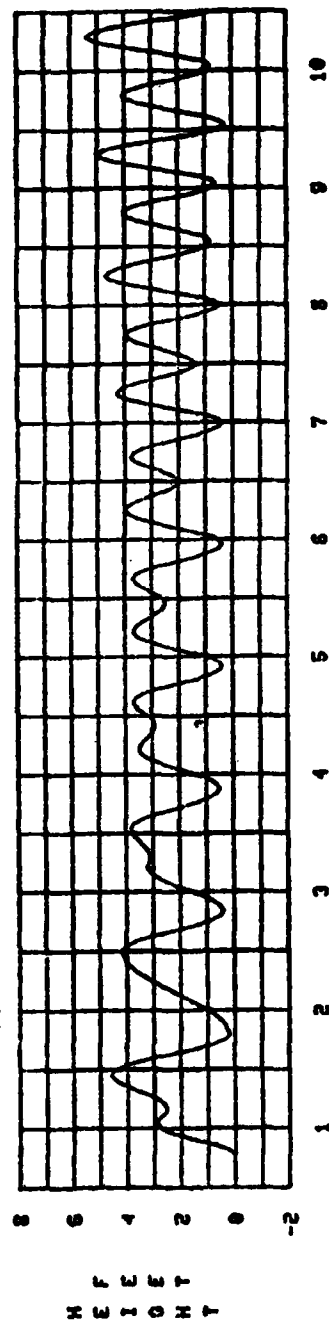


TABLE 14

POINT MUGU TIDES

JUNE 1983

34 DEG 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0742	.2	1529	3.4	1857	3.1	2103	---
2	0825	4.1	0836	.5	1615	3.6	2232	3.0
3	0148	3.7	0928	.6	1647	3.9	2330	2.5
4	0317	3.5	1017	.8	1715	4.2	---	---
5	0438	3.4	1056	.9	1737	4.6	---	---
6	0613	1.4	0544	3.4	1131	1.1	1802	5.0
7	0852	.7	0640	3.5	1210	1.9	1829	5.5
8	0131	0.0	0730	3.6	1245	1.5	1901	5.9
9	0209	-.6	0821	3.7	1321	1.6	1934	6.2
10	0251	-1.1	0909	3.7	1359	1.8	2011	6.5
11	0337	-1.4	1002	3.7	1444	2.0	2053	6.6
12	0426	-1.5	1058	3.7	1530	2.2	2139	6.5
13	0515	-1.4	1154	3.8	1623	2.4	2229	6.2
14	0609	-1.2	1259	3.8	1728	2.5	2326	5.7
15	0704	-.9	1402	4.0	1851	2.6	---	---
16	0802	5.0	0802	-.5	1501	4.3	2026	2.5
17	0151	4.4	0859	0.0	1553	4.6	2201	2.0
18	0318	3.9	0954	.9	1641	5.0	2317	1.3
19	0443	3.6	1043	.9	1723	5.4	---	---
20	0617	.7	0600	3.5	1131	1.2	1800	5.7
21	0106	-.3	0706	3.5	1213	1.6	1836	5.9
22	0151	-.6	0802	3.5	1252	1.9	1908	6.0
23	0230	-.7	0848	3.5	1327	2.1	1943	6.1
24	0308	-.7	0934	3.5	1402	2.3	2014	6.0
25	0418	-.7	1013	3.5	1438	2.4	2046	5.9
26	0454	-.5	1053	3.5	1510	2.5	2118	5.8
27	0531	-.3	1135	3.5	1546	2.5	2153	5.5
28	0608	-.1	1218	3.5	1630	2.7	2227	5.2
29	0646	.2	1307	3.6	1716	2.8	2307	4.8
30	---	---	1353	3.6	1822	2.9	2350	4.3

--- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 15

SAN NICOLAS ISLAND TIDES

JUNE 1983

33 DEG 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0752	.2	1536	3.2	1907	2.9	---	---
2	0832	3.5	0846	.5	1622	3.4	2113	2.8
3	0155	3.3	0938	.7	1654	3.6	2242	2.4
4	0324	3.3	1027	.8	1722	3.9	2340	1.8
5	0445	3.2	1106	3.2	1744	4.3	---	---
6	0623	1.3	0551	3.3	1141	1.0	1809	4.6
7	0841	.6	0647	3.3	1220	1.2	1836	5.1
8	0141	0.0	0737	3.4	1255	1.4	1908	5.5
9	0219	-.5	0828	3.5	1331	1.5	1941	5.7
10	0301	-1.0	0916	3.5	1409	1.6	2018	6.0
11	0347	-1.3	1009	3.5	1454	1.8	2100	6.1
12	0436	-1.4	1105	3.5	1540	2.0	2146	6.0
13	0525	-1.3	1201	3.5	1633	2.2	2236	5.7
14	0619	-1.1	1306	3.5	1738	2.4	2333	5.3
15	0714	-.8	1409	3.7	1801	2.5	---	---
16	0830	4.6	0812	-.5	1508	4.0	2036	2.3
17	0158	4.1	0909	0.0	1600	4.3	2211	1.8
18	0325	3.6	1004	.4	1648	4.6	2327	1.2
19	0450	3.4	1053	.8	1730	5.0	---	---
20	0627	.6	0607	3.3	1141	1.1	1807	5.3
21	0116	-.1	0713	3.3	1223	1.5	1843	5.5
22	0201	-.3	0809	3.3	1302	1.7	1915	5.6
23	0240	-.5	0855	3.3	1337	1.9	1950	5.6
24	0318	-.6	0941	3.3	1412	2.1	2053	5.5
25	0353	-.6	1020	3.3	1448	2.2	2125	5.4
26	0428	-.6	1100	3.3	1520	2.4	2200	5.1
27	0504	-.5	1142	3.3	1556	2.5	2234	4.8
28	0541	-.3	1215	3.3	1640	2.6	2314	4.5
29	0618	-.1	1314	3.3	1726	2.7	---	---
30	0656	.2	1400	3.4	1832	2.7	2357	4.0

--- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES

JUNE 1983

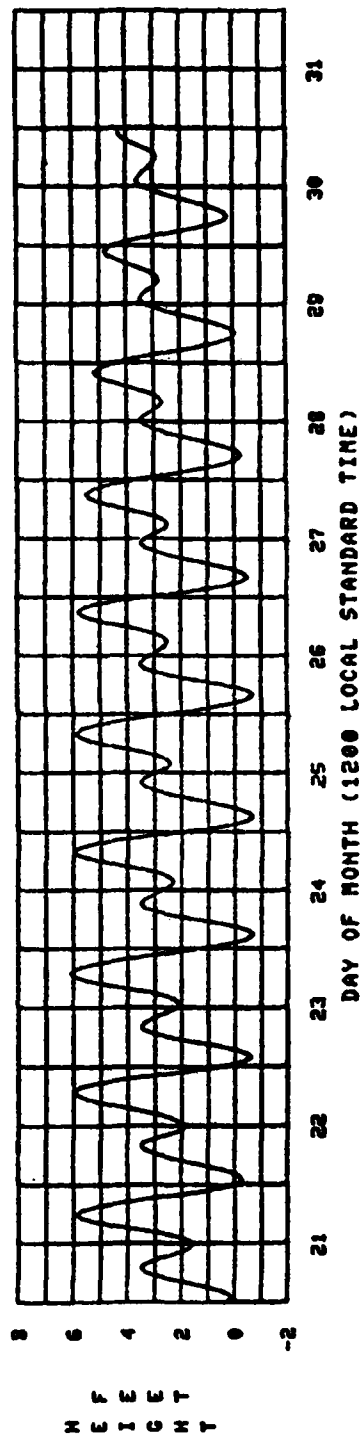
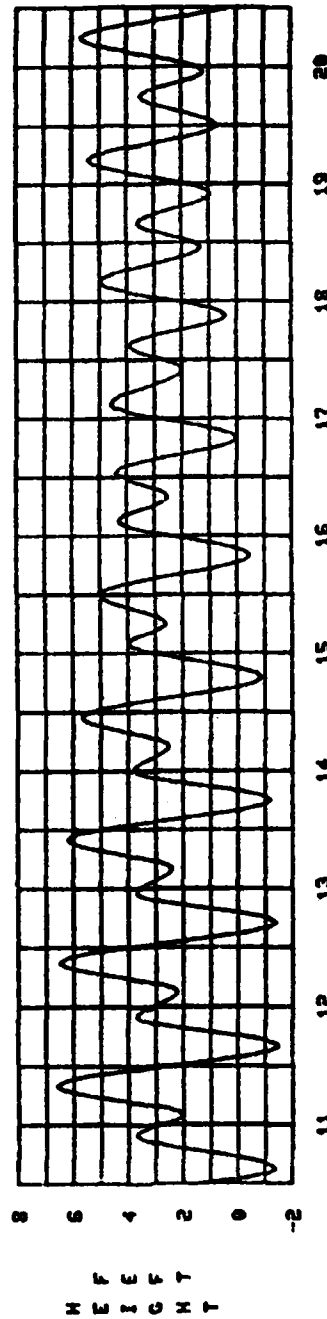
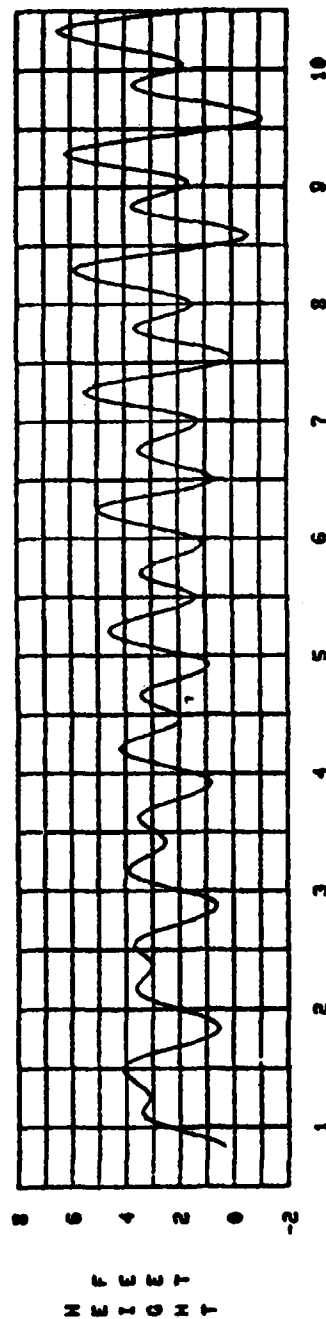


TABLE 16
POINT MUGU TIDES
JULY 1983
34-DEG 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0728	.6	1438	3.8	1950	2.8	2125	---
2	0048	3.4	0811	.9	1520	4.1	2215	2.5
3	0211	3.4	0857	1.2	1550	4.4	2245	2.0
4	0349	3.1	0939	1.5	1636	4.8	2341	1.3
5	0518	3.1	1032	1.8	1711	5.3	---	---
6	0630	.6	0630	3.2	1120	2.0	1750	5.8
7	0114	---	0727	3.4	1210	2.1	1832	6.2
8	0157	---	0819	3.7	1258	2.1	1914	6.6
9	0242	1.3	0905	3.8	1345	2.1	1959	6.9
10	0325	1.6	0952	4.0	1436	2.1	2045	7.0
11	0412	1.6	1039	4.1	1525	2.1	2133	6.8
12	0458	1.5	1125	4.2	1624	2.1	2225	6.4
13	0545	1.1	1217	4.4	1727	2.1	2319	5.8
14	0633	-.6	1309	4.5	1841	2.1	---	---
15	0020	5.0	0720	0.0	1404	4.7	2006	2.0
16	0133	4.2	0812	.6	1457	5.0	2136	1.7
17	0304	3.6	0906	1.2	1554	5.2	2258	1.2
18	0443	3.3	1003	1.7	1643	5.5	0008	1.6*
19	0613	3.3	1102	2.1	1731	5.6	---	---
20	0100	.1	0720	3.4	1154	2.3	1813	5.8
21	0145	-.2	0810	3.6	1240	2.5	1851	5.9
22	0221	-.3	0850	3.7	1319	2.5	1928	6.0
23	0255	-.5	0924	3.7	1357	2.5	2002	6.0
24	0327	-.5	0954	3.8	1430	2.4	2034	6.0
25	0357	-.5	1024	3.8	1505	2.4	2106	5.9
26	0428	-.3	1053	3.9	1541	2.4	2138	5.7
27	0457	-.1	1123	3.9	1616	2.4	2211	5.4
28	0527	.5	1155	4.0	1659	2.5	2245	4.9
29	0555	.9	1220	4.0	1748	2.5	2324	4.4
30	0627	.9	1308	4.2	1854	2.5	---	---
31	0015	3.9	0659	1.3	1347	4.3	2023	2.3

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 17
SAN NICO AS ISLAND TIDES
JULY 1983
33-DEG 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0738	.5	1445	3.5	2000	2.6	---	---
2	0055	3.2	0821	.8	1527	3.8	2135	2.4
3	0218	3.2	0907	1.1	1606	4.1	2255	1.8
4	0356	2.9	0949	1.4	1643	4.5	2351	1.2
5	0525	2.9	1042	1.6	1718	4.9	---	---
6	0040	.5	0637	3.0	1130	1.8	1757	5.4
7	0124	---	0734	3.2	1220	1.9	1839	5.7
8	0207	-.7	0826	3.5	1308	1.9	1921	6.1
9	0252	1.2	0912	3.5	1355	1.9	2003	6.4
10	0335	1.5	0950	3.7	1446	1.9	2052	6.5
11	0422	1.5	1046	3.8	1535	1.9	2140	6.3
12	0508	1.4	1132	3.9	1634	1.9	2232	5.9
13	0555	1.0	1224	4.1	1737	1.9	2326	5.4
14	0643	-.5	1316	4.2	1851	1.9	---	---
15	0027	4.6	0730	0.0	1411	4.4	2016	1.8
16	0140	3.9	0822	.5	1504	4.6	2146	1.5
17	0311	3.4	0916	1.1	1601	4.8	2308	1.1
18	0450	3.1	1013	1.5	1650	5.1	0018	.5*
19	0620	3.1	1112	1.9	1738	5.2	---	---
20	0110	.2	0727	3.2	1804	2.1	1820	5.4
21	0155	-.2	0817	3.4	1850	2.3	1858	5.5
22	0231	-.4	0857	3.5	1929	2.3	1935	5.6
23	0305	-.5	0931	3.5	1407	2.3	2009	5.6
24	0337	-.5	1001	3.5	1451	2.2	2041	5.5
25	0407	-.3	1031	3.5	1515	2.2	2113	5.5
26	0438	-.1	1100	3.6	1551	2.2	2145	5.3
27	0507	.1	1130	3.6	1626	2.3	2218	5.0
28	0537	.5	1200	3.7	1709	2.3	2252	4.6
29	0605	.8	1236	3.7	1758	2.3	2331	4.1
30	0637	.8	1315	3.9	1804	2.3	---	---
31	0022	3.6	0709	1.2	1354	4.0	2033	2.1

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES

JULY 1983

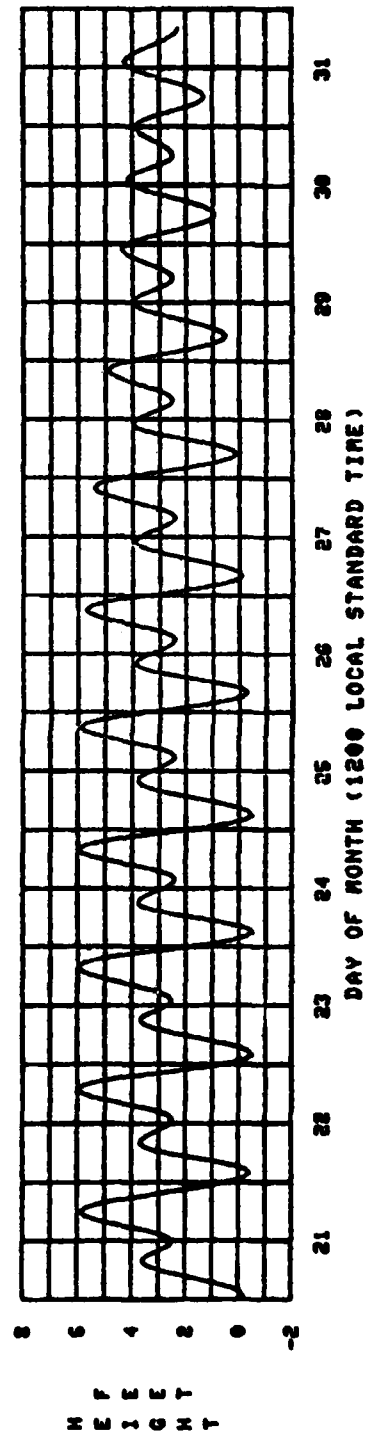
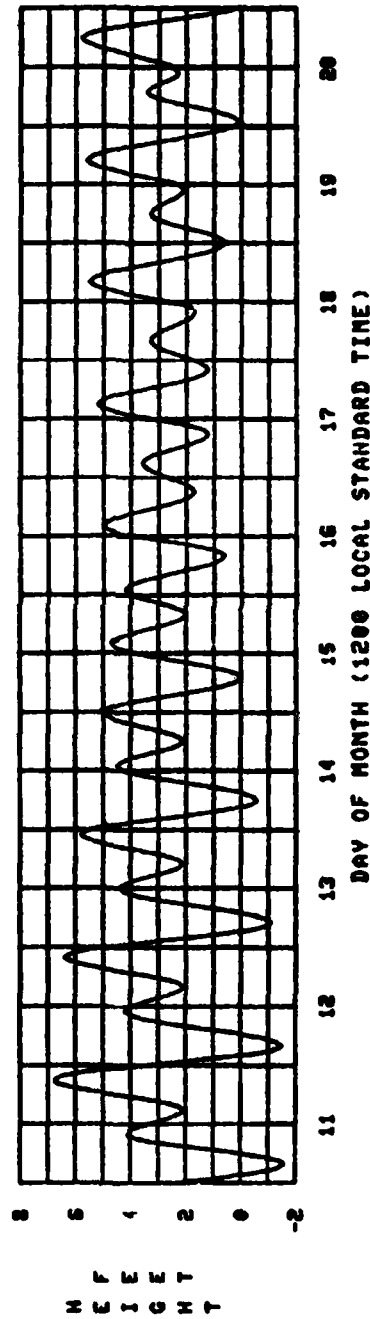
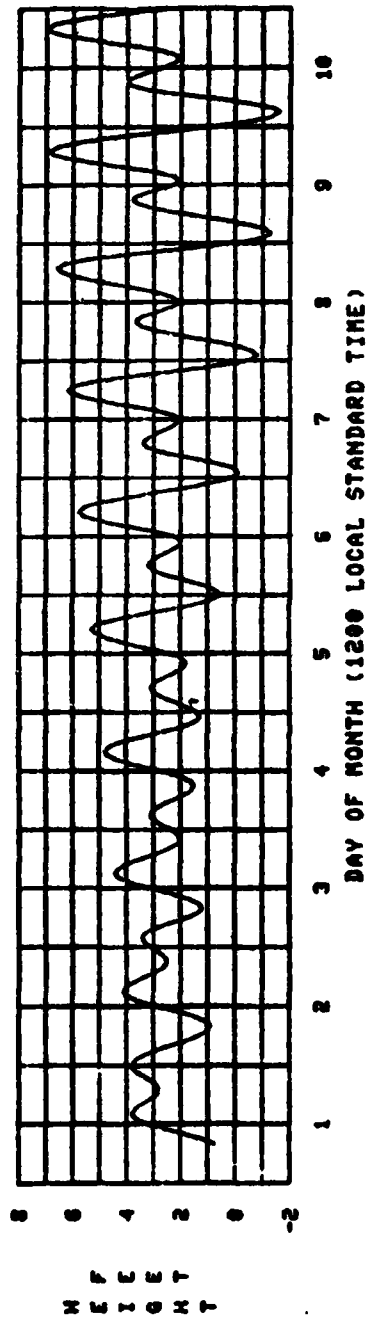


TABLE 18
POINT MUGU TIDES
AUGUST 1983
34 DEG 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0129	3.3	0736	1.8	1436	4.6
2	0322	2.9	0827	2.2	1533	4.9
3	0521	3.0	0932	2.4	1626	5.3
4	0010	.5	0635	3.3	1050	2.5
5	0142	.8	0728	3.6	1154	2.5
6	0226	-1.2	0807	3.9	1250	2.3
7	0309	-1.4	0849	4.2	1342	1.7
8	0349	-1.4	0928	4.4	1432	1.5
9	0430	-1.1	1007	4.7	1524	1.5
10	0511	-0.6	1045	4.8	1617	1.4
11	0552	0.0	1128	5.0	1713	1.4
12	0634	0.7	1213	5.1	1819	1.5
13	0720	1.5	1302	5.1	1935	1.5
14	0815	2.1	1357	5.1	2104	1.4
15	0927	2.5	1459	5.1	2237	1.0
16	1048	2.7	1606	5.2	2351	.6
17	1152	2.7	1705	5.3	---	---
18	1242	2.6	1840	5.7	---	---
19	1319	2.3	1918	5.8	---	---
20	1351	2.3	1950	5.9	---	---
21	1423	2.1	2022	5.9	---	---
22	1455	2.0	2051	5.8	---	---
23	1527	1.8	2123	5.6	---	---
24	1602	1.8	2155	5.2	---	---
25	1641	1.8	2227	4.8	---	---
26	1726	1.8	2309	4.3	---	---
27	1822	1.8	2359	3.7	---	---
28	1934	1.7	---	---	---	---
29	2045	1.8	---	---	---	---
30	2155	1.5	---	---	---	---
31	2309	1.0	---	---	---	---

--- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 19
SAN NICOLAS ISLAND TIDES
AUGUST 1983
33 DEG 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0136	3.1	0746	1.6	1443	4.3
2	0329	2.7	0837	2.0	1540	4.6
3	0528	2.8	0942	2.2	1633	4.9
4	0610	.5	0642	3.4	1100	2.3
5	0710	.2	0735	3.4	1204	2.3
6	0814	3.6	0814	3.6	1300	2.1
7	0935	4.1	0856	3.9	1352	1.8
8	1052	4.4	0935	4.1	1442	1.5
9	1213	4.5	1014	4.4	1534	1.4
10	1339	4.6	1052	4.5	1627	1.3
11	1464	4.7	1135	4.6	1723	1.3
12	1586	4.7	1220	4.7	1829	1.4
13	1706	4.7	1309	4.7	1945	1.4
14	1822	4.8	1404	4.7	2114	1.3
15	1935	4.8	1506	4.7	2247	.9
16	2045	4.8	1613	4.8	0001	.5*
17	2155	4.9	1711	4.9	---	---
18	2309	4.9	1805	5.1	---	---
19	0001	5.3	1847	5.3	---	---
20	0137	5.5	1925	5.4	---	---
21	0242	5.5	1957	5.5	---	---
22	0311	5.5	2029	5.5	---	---
23	0335	5.4	2058	5.4	---	---
24	0401	5.2	2130	5.2	---	---
25	0425	5.2	2202	4.8	---	---
26	0448	4.8	2234	4.5	---	---
27	0513	4.3	2316	4.0	---	---
28	0534	3.7	0006	3.5*	---	---
29	0603	3.1	---	---	---	---
30	0625	2.9	---	---	---	---
31	0634	2.7	---	---	---	---

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES

AUGUST 1983

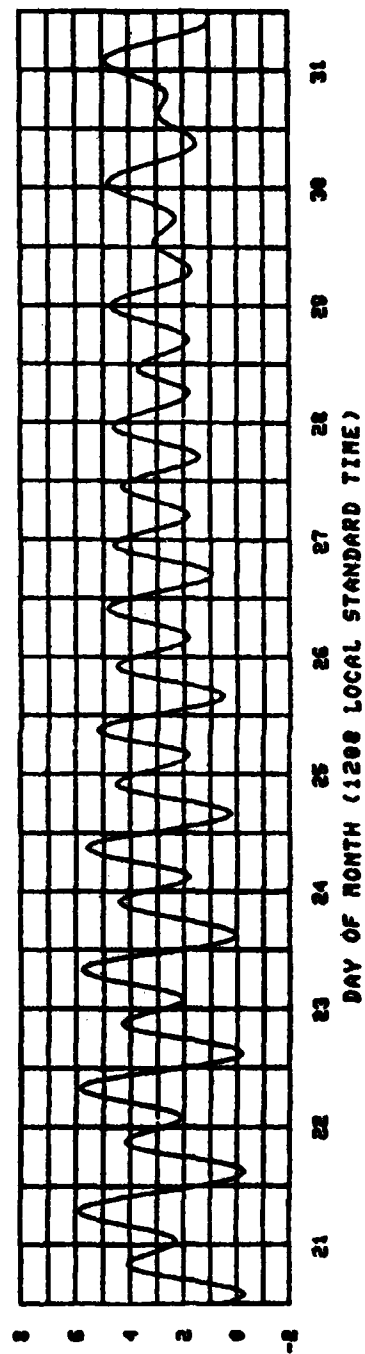
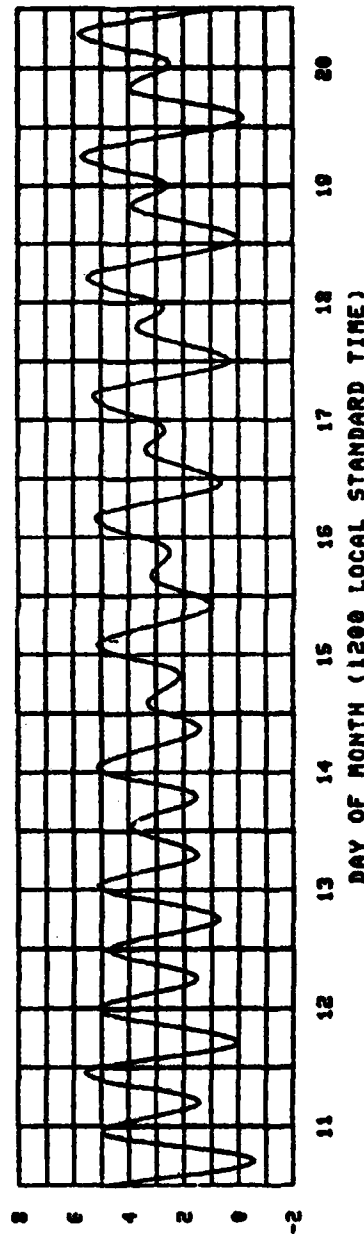
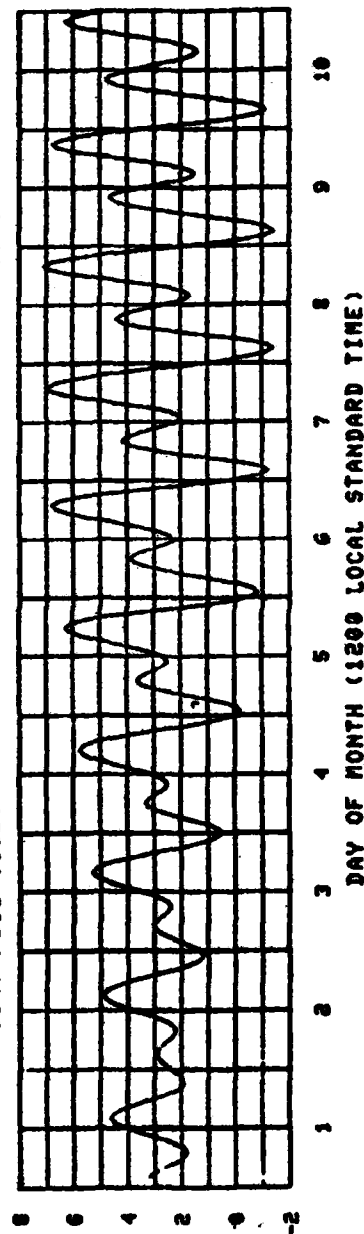


TABLE 20

POINT MUGU TIDES
SEPTEMBER 1983

34 DEG 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0542	3.2	0913	2.9	1553	5.2	2349	.3
2	0637	3.6	1050	2.8	1705	5.7	2449	6.2
3	0040	3.3	0713	4.0	1159	2.5	1801	6.6
4	0121	3.8	0745	4.3	1252	2.0	1853	6.8
5	0203	1.0	0820	4.7	1341	1.5	1943	6.8
6	0241	1.1	0854	5.0	1428	1.1	2030	6.7
7	0318	1.9	0928	5.3	1515	.8	2117	6.4
8	0356	1.4	1003	5.5	1604	.6	2205	5.8
9	0431	.1	1040	5.6	1657	.6	2255	5.1
10	0507	.8	1117	5.5	1756	.7	2354	4.3
11	0542	1.6	1150	5.3	1902	.9	2028	1.0
12	0619	3.2	0624	2.7	1952	5.1	2206	.9
13	0311	3.2	0717	2.7	1358	4.8	2322	.7
14	0524	3.4	0902	3.1	1522	4.7	1739	5.0
15	0632	3.7	1053	4.8	1641	4.8	1824	5.3
16	0018	.4	0707	4.0	1157	2.8	1900	5.4
17	0058	.2	0734	4.2	1239	2.5	1935	5.5
18	0130	.1	0754	4.3	1313	1.9	2007	5.5
19	0157	.1	0814	4.5	1344	1.6	2036	5.4
20	0222	.2	0832	4.6	1412	1.3	2108	5.2
21	0244	.2	0853	4.8	1443	1.1	2142	4.8
22	0309	.4	0912	5.0	1513	1.0	2221	4.4
23	0330	.7	0934	5.1	1546	.9	2303	3.9
24	0352	1.0	0956	5.2	1625	.9	1912	1.0
25	0413	1.4	1021	5.2	1707	1.0	2048	.9
26	0438	1.9	1053	5.2	1803	1.0	2222	.1
27	0005	3.4	0500	2.7	1130	5.0		
28	0148	3.0	0529	2.7	1225	5.0		
29	0352	4.9	0928	3.2	1530	5.0		
30	0547	3.6						

X -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 21

SAN NICOLAS ISLAND TIDES
SEPTEMBER 1983

33 DEG 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0549	3.0	0923	2.7	1600	4.8	2359	.3
2	0644	3.4	1100	2.6	1712	5.3	2449	5.7
3	0050	3.3	0720	3.7	1209	2.3	1808	6.1
4	0131	3.7	0752	4.0	1302	1.8	1900	6.3
5	0213	1.9	0827	4.4	1351	1.4	2037	6.2
6	0251	1.0	0901	4.6	1438	1.0	2124	5.9
7	0328	1.4	0935	4.9	1525	.7	2202	4.7
8	0406	1.1	1010	5.1	1614	.5	2302	4.0x
9	0441	.7	1047	5.2	1707	.6	2001	.9
10	0517	1.5	1124	4.9	1806	.8	2038	.8
11	0552	3.4	1206	2.9	1912	4.5	2216	.6
12	0634	3.0	0727	2.5	1259	4.4	2332	.6
13	0318	3.2	0912	2.8	1405	4.5	1746	4.6
14	0531	3.5	1103	3.7	1529	2.6	1831	4.9
15	0639	.4	0714	3.9	1648	2.3	1907	5.1
16	0028	.1	0741	4.0	1207	1.7	2042	5.0
17	0108	.1	0801	4.2	1249	1.5	2115	4.8
18	0140	.2	0821	4.3	1323	1.2	2043	4.5
19	0207	.2	0839	4.5	1422	.9	2149	4.1
20	0232	.4	0909	4.6	1453	.8	2228	3.6
21	0319	.6	0941	4.8	1523	.8	2310	3.6
22	0340	1.3	1003	4.8	1556	.9	2058	.8
23	0402	1.7	1028	4.8	1635	.9	2122	.8
24	0423	2.8	1050	2.5	1717	4.7	2229	.5
25	0448	3.4	1103	3.0	1813	4.6	2332	.1
26	0012	3.4	0539	2.5	1232	4.6		
27	0155	4.6	0539	2.5	1232	4.6		
28	0359	3.4	0938	3.0	1537	4.6		
29	0554	3.4						
30								

X -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES

SEPTEMBER 1983

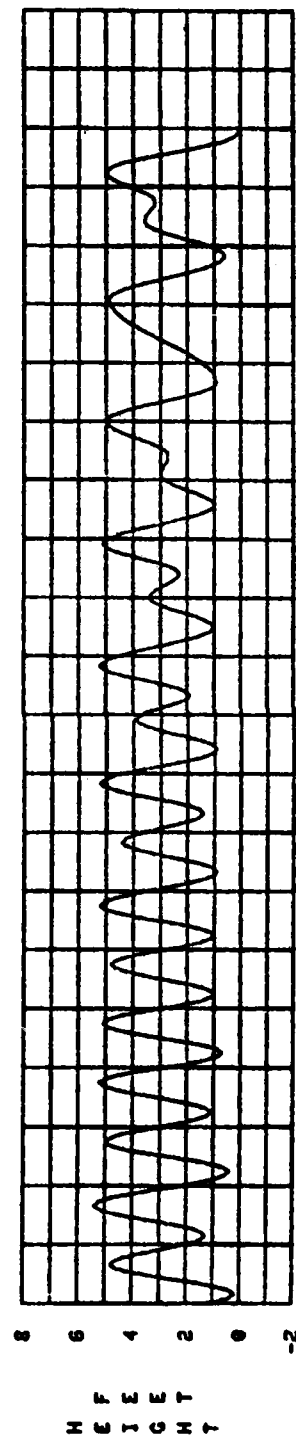
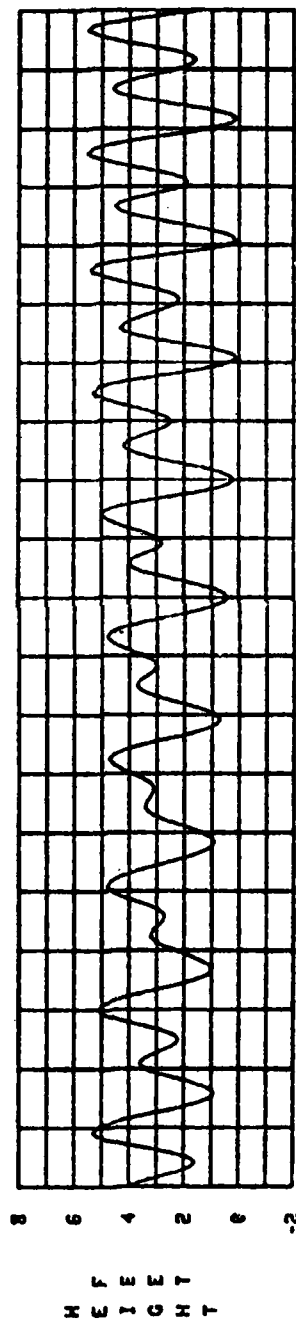
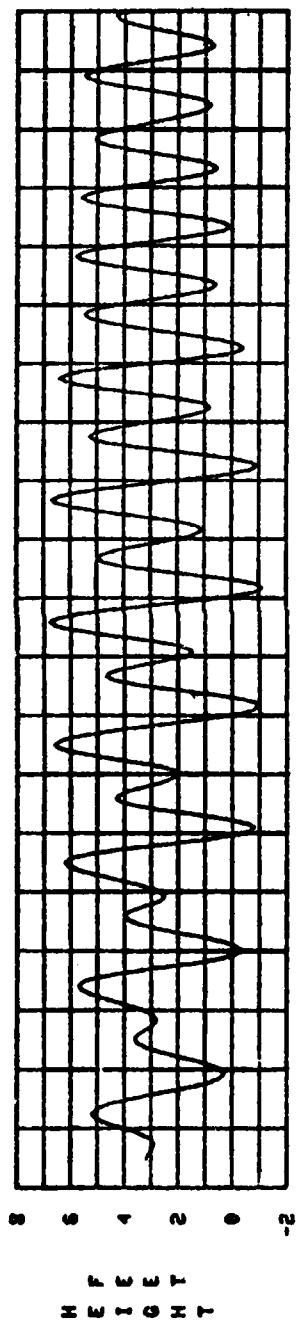


TABLE 22

POINT MUGU TIDES

OCTOBER 1983

34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0619	4.0	1101	2.8	1650	5.4	1752	5.8
2	0013	-0.3	0648	4.4	1202	2.2	1845	6.0
3	0056	-0.5	0716	4.9	1253	1.5	1936	6.1
4	0132	-0.6	0745	5.3	1339	0.9	2022	5.9
5	0207	-0.4	0817	5.7	1422	0.3	2107	5.6
6	0242	-0.1	0848	6.0	1508	0.0	2157	5.0
7	0316	0.4	0920	6.1	1554	-0.2	2248	4.4
8	0348	1.0	0954	6.0	1642	-0.1	2349	3.9
9	0420	1.6	1029	5.8	1731	0.1	---	---
10	0452	2.2	1104	5.5	1833	0.4	---	---
11	0109	3.4	0527	2.7	1147	5.1	1946	7.7
12	0326	3.3	0609	3.2	1247	4.6	2118	8.7
13	0528	3.6	0847	3.4	1421	4.3	2237	7.7
14	0608	3.9	1050	3.2	1558	4.3	2333	6.6
15	0632	4.2	1148	2.7	1706	4.5	---	---
16	0013	0.4	0651	4.4	1226	2.4	1755	4.7
17	0045	0.4	0709	4.6	1255	1.9	1837	4.8
18	0113	0.4	0730	4.8	1327	1.4	1913	4.9
19	0137	0.5	0746	5.1	1358	1.0	1948	4.9
20	0200	0.7	0805	5.3	1427	0.6	2023	4.8
21	0222	0.9	0827	5.5	1459	0.3	2059	4.6
22	0244	1.2	0851	5.7	1534	0.1	2137	4.3
23	0309	1.5	0917	5.8	1613	0.0	2223	4.0
24	0334	1.9	0943	5.8	1658	0.0	2314	3.6
25	0403	2.3	1018	5.7	1753	0.1	---	---
26	0426	3.3	0431	2.6	1101	5.4	1902	3.3
27	0225	3.2	0515	3.0	1159	5.1	2026	3.3
28	0423	3.5	0713	3.3	1329	4.8	2142	2.2
29	0507	3.9	0944	3.1	1511	4.7	2246	0.0
30	0545	4.4	1107	2.5	1638	4.9	2338	-0.1
31	0612	4.9	1204	1.7	1743	5.1	---	---

* -- TIDE OCCURS ON NEXT DATE.

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 23

SAN NICOLAS ISLAND TIDES

OCTOBER 1983

33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0626	3.7	1111	2.6	1657	5.0	1759	5.4
2	0023	-0.3	0655	4.1	1212	2.0	1823	5.6
3	0106	-0.5	0723	4.6	1303	1.4	1943	5.6
4	0142	-0.5	0752	4.9	1349	0.8	2039	5.5
5	0217	-0.4	0824	5.3	1432	0.3	2114	5.2
6	0252	-0.1	0855	5.6	1518	0.0	2204	4.6
7	0326	0.9	0927	5.6	1604	-0.2	2255	4.1
8	0358	1.5	1001	5.4	1652	-0.1	2356	3.6
9	0430	2.0	1036	5.1	1741	0.1	---	---
10	0502	2.9	1111	4.7	1843	0.4	---	---
11	0516	3.2	0537	2.5	1154	4.3	1956	6.7
12	0333	3.1	0619	3.0	1254	4.0	2128	6.5
13	0535	3.4	0857	3.2	1428	4.0	2247	5.5
14	0615	3.6	1100	3.0	1605	4.2	---	---
15	0639	3.9	1158	2.5	1713	4.2	---	---
16	0023	0.4	0658	4.1	1236	2.2	1802	4.4
17	0055	0.4	0716	4.3	1305	1.7	1844	4.5
18	0123	0.4	0737	4.5	1337	1.3	1920	4.6
19	0147	0.5	0753	4.7	1408	0.9	1955	4.5
20	0210	0.8	0812	4.9	1437	0.5	2030	4.3
21	0232	1.1	0834	5.1	1509	0.3	2106	4.0
22	0254	1.4	0858	5.3	1544	0.1	2144	3.7
23	0319	1.7	0924	5.4	1623	0.0	2230	3.4
24	0344	2.1	0950	5.4	1708	0.0	2321	3.4
25	0413	2.1	1025	5.3	1803	0.1	---	---
26	0033	3.1	0441	2.5	1108	5.0	1912	3.3
27	0232	3.0	0525	2.8	1206	4.7	2036	3.2
28	0430	3.3	0723	3.1	1336	4.5	2152	0.0
29	0514	3.6	0954	2.9	1518	4.4	2256	-0.1
30	0552	4.1	1117	2.3	1645	4.6	---	---
31	0619	4.6	1214	1.5	1750	4.7	---	---

* -- TIDE OCCURS ON NEXT DATE.

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

POINT MUGU TIDES

OCTOBER 1983

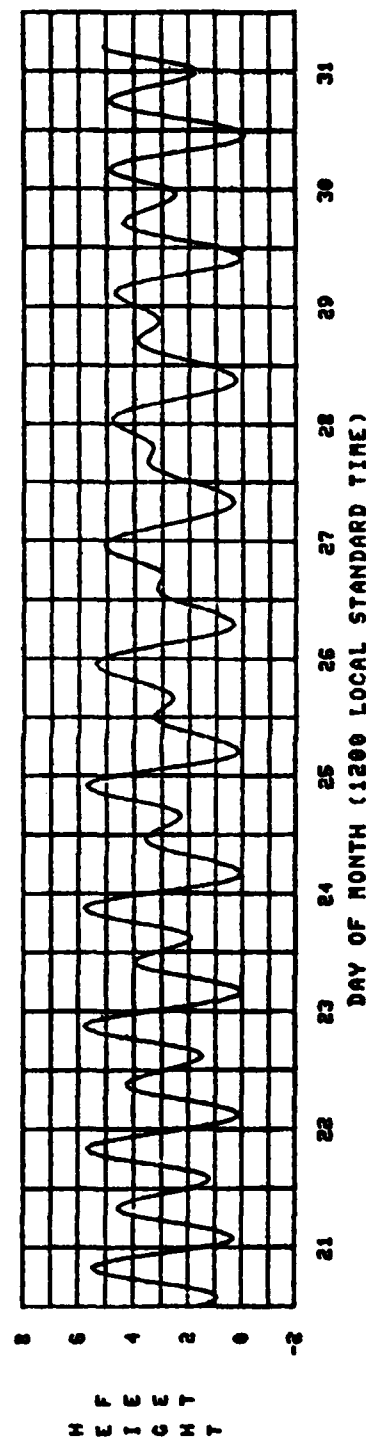
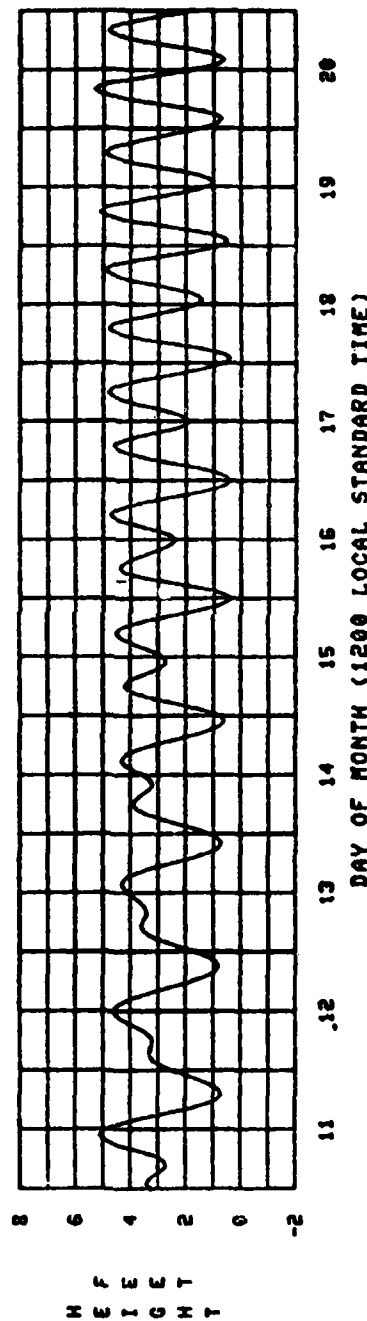
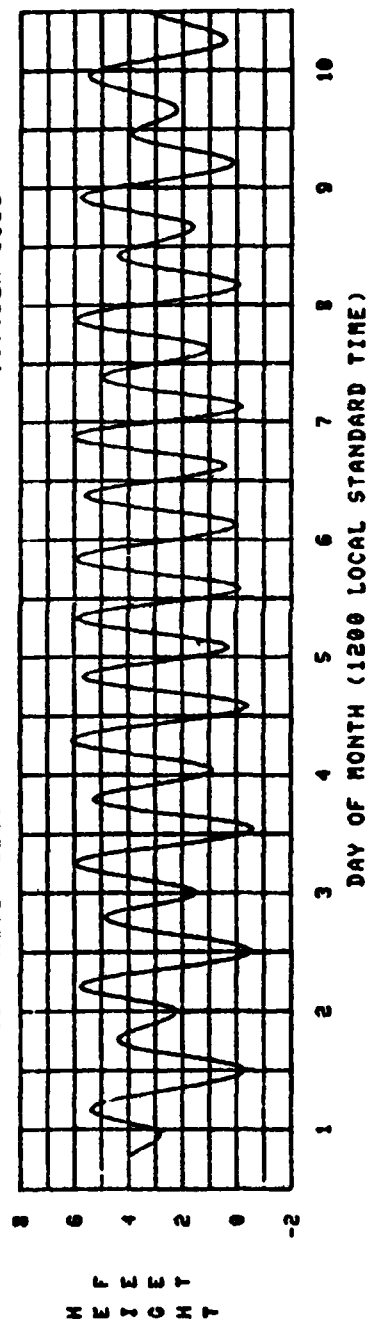


TABLE 24

POINT MUGU TIDES

NOVEMBER 1983

34 DEG 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0020	-1.1	0643	5.4	1250	1.0	1839	5.1
2	0058	.1	0712	5.8	1335	.3	1931	5.1
3	0133	.4	0743	6.2	1419	-3	2018	4.9
4	0206	.8	0813	6.4	1502	-6	2107	4.6
5	0237	1.2	0845	6.4	1544	-7	2156	4.3
6	0309	1.7	0916	6.3	1626	-6	2247	3.9
7	0341	2.1	0948	6.0	1715	-4	2346	3.6
8	0410	2.5	1023	5.6	1804	0.0	---	---
9	0453	3.3	0442	5.0	1100	5.1	1907	.3
10	0500	3.4	0530	3.9	1149	4.6	2020	.7
11	0518	3.6	0609	3.5	1305	4.2	2130	.7
12	0542	3.9	0744	3.2	1444	3.9	2229	.7
13	0582	4.2	1118	2.7	1614	4.0	2314	.8
14	0602	4.5	1203	2.3	1716	4.1	---	---
15	0623	4.8	1236	1.7	1808	4.1	1851	4.1
16	0648	.9	0640	5.1	1308	1.1	1933	4.2
17	0706	1.0	0702	5.4	1340	.6	2012	4.1
18	0714	1.2	0723	5.7	1414	.1	2055	4.1
19	0740	1.4	0749	6.0	1449	-3	2139	3.9
20	0808	1.7	0816	6.2	1526	-6	2230	3.5
21	0837	1.9	0847	6.3	1607	-7	---	---
22	0909	2.2	0924	6.1	1655	-7	1851	-4
23	0947	2.5	1003	5.7	1748	-6	1954	-2
24	1001	3.1	0436	5.3	1852	5.3	2104	0.0
25	1041	3.4	0545	4.8	1954	4.8	2204	.3
26	1104	3.8	0741	4.3	1316	4.4	2344	.6
27	1158	4.2	0936	4.1	1453	4.3	---	---
28	1250	4.7	1159	1.2	1622	4.2	---	---
29	0534	5.2	---	---	1735	4.2	---	---
30	0608	5.7	1250	.4	1837	4.2	---	---

* --- TIDE OCCURS ON NEXT DATE.

TABLE 25

SAN NICOLAS ISLAND TIDES

NOVEMBER 1983

33 DEG 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0030	-1.1	0650	5.0	1300	.9	1846	4.7
2	0108	.1	0719	5.4	1345	.3	1938	4.6
3	0143	.4	0750	5.7	1429	-3	2025	4.3
4	0216	.7	0820	5.9	1512	-5	2114	4.0
5	0247	1.1	0852	5.9	1554	-6	2203	3.6
6	0319	1.5	0923	5.8	1636	-5	2254	3.4
7	0351	1.9	0955	5.6	1725	-4	2353	---
8	0420	2.4	1030	5.2	1814	0.0	---	---
9	0452	3.1	0540	3.1	1107	4.7	1917	.3
10	0507	3.2	0654	3.3	1156	4.3	2030	.6
11	0525	3.4	0754	3.0	1312	3.9	2140	.6
12	0549	3.6	1019	2.5	1451	3.6	2239	.6
13	0609	4.2	1128	2.1	1621	3.7	2324	.7
14	0630	4.5	1246	1.5	1723	3.8	2359	---
15	0658	.8	0647	4.7	1815	1.0	---	---
16	0706	.9	0709	5.0	1318	.5	1828	3.8
17	0723	1.1	0730	5.3	1350	.1	1940	3.8
18	0749	1.3	0756	5.6	1424	-3	2019	3.8
19	0816	1.5	0823	5.7	1459	-5	2102	3.6
20	0847	1.7	0854	5.8	1536	-6	2146	3.5
21	0919	2.0	0931	5.8	1617	-6	2237	3.3
22	0957	2.3	1010	5.6	1705	-5	---	---
23	1048	2.2	0446	5.5	1758	5.3	1901	-4
24	1111	2.3	0555	5.2	1859	4.9	2004	-2
25	1158	2.5	0751	4.5	1201	4.5	2114	0.0
26	1250	2.9	0946	4.1	1323	4.1	2214	.1
27	0504	1.9	1108	1.9	1500	4.0	2308	.5
28	0541	4.8	1200	1.1	1629	3.9	2354	---
29	0615	5.3	1300	.4	1742	3.9	---	---
30	---	---	---	---	1844	---	---	---

* --- TIDE OCCURS ON NEXT DATE.

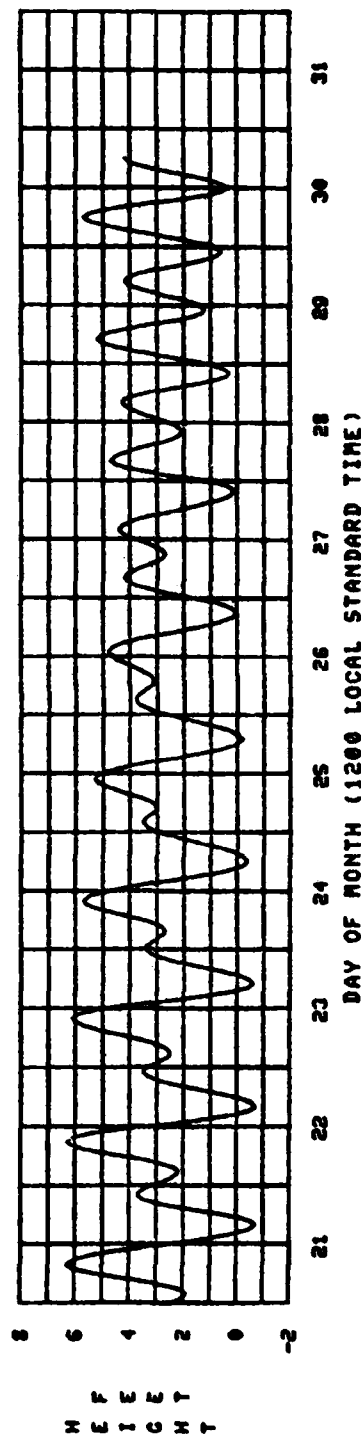
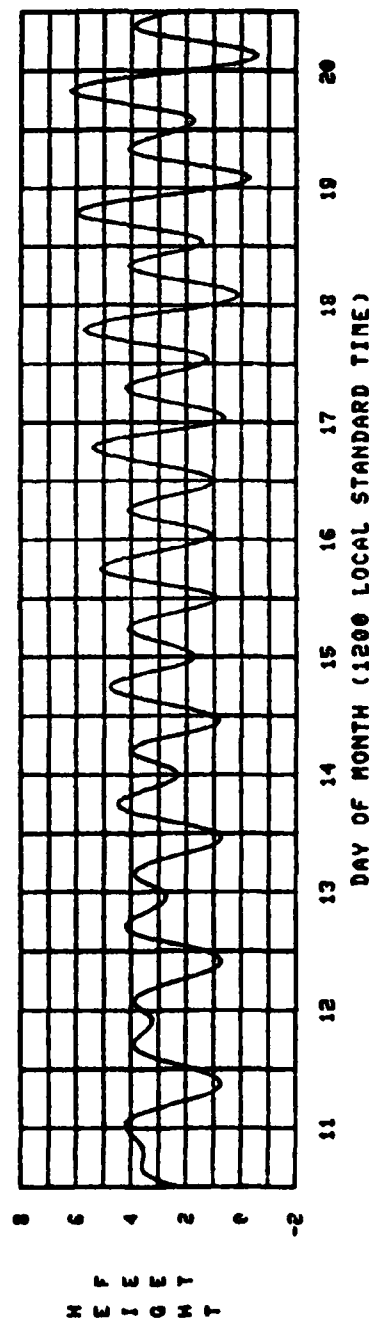
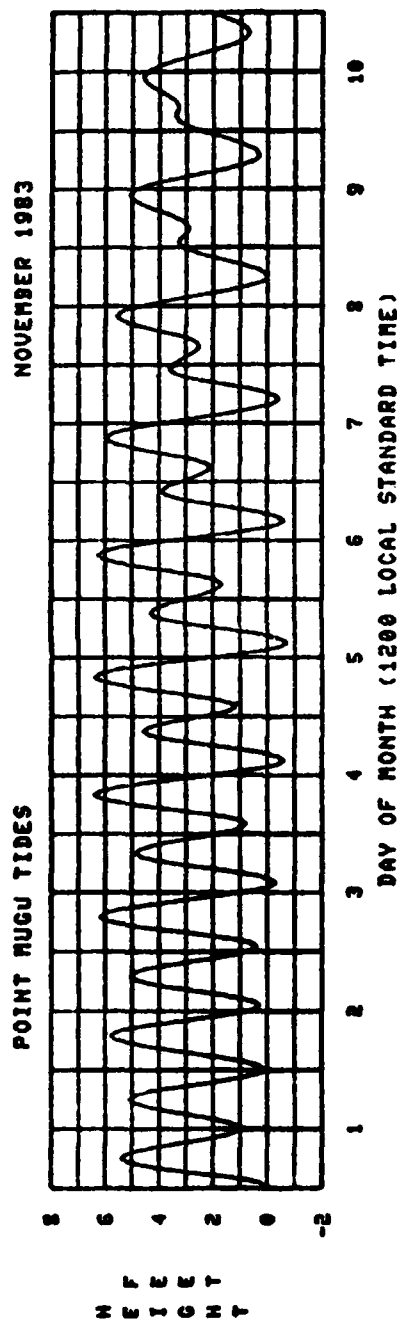


TABLE 28

POINT HUGU TIDES

DECEMBER 1983

34 DEC 06 MIN N, 119 DEG 06 MIN U - OCEAN PIER

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0023	.9	0643	6.1	1333	-2	1931	4.2
2	0101	1.2	0714	6.3	1415	-6	2024	4.1
3	0133	1.5	0746	6.5	1457	-9	2110	4.0
4	0208	1.8	0819	6.4	1536	-1.0	2157	3.8
5	0240	2.1	0851	6.3	1615	-9	2247	3.7
6	0312	2.4	0923	6.0	1657	-6	2336	3.5
7	0348	2.6	0956	5.7	1742	-3	---	---
8	0435	3.4	1026	5.3	1831	5.3	1829	0.0
9	0514	3.4	1056	3.1	1913	4.8	1918	.3
10	0559	3.5	1125	3.2	2005	4.3	2014	.6
11	0635	3.8	1157	3.1	2051	3.8	2108	.8
12	0714	4.0	1228	2.7	2137	3.5	2157	1.1
13	0754	4.4	1259	2.2	2218	3.3	2240	1.3
14	0824	4.7	1324	1.6	2304	3.4	2318	1.4
15	0852	5.1	1352	.9	2354	3.6	---	1.6
16	0917	5.5	1424	.3	---	---	---	---
17	0929	1.7	1458	5.9	1500	3.3	2010	3.7
18	0959	1.9	1518	6.2	1538	3.8	2056	3.7
19	1039	2.0	1555	6.5	1619	-1.2	2141	3.8
20	1121	2.1	1633	6.6	1702	-1.3	2231	3.8
21	1203	2.2	1655	6.6	1734	-1.3	2320	3.8
22	1252	2.3	1701	6.4	1827	-1.2	---	---
23	0016	3.8	1749	2.5	1913	5.3	1827	-.8
24	0115	3.9	1800	2.5	2009	4.6	1953	-.4
25	0217	4.2	1831	2.5	2117	4.0	2039	.1
26	0316	4.5	1854	2.2	2212	3.5	2117	.5
27	0407	4.9	1915	1.5	2306	3.6	2202	1.0
28	0454	5.3	1954	.8	2354	3.5	2306	1.4
29	0536	5.7	2004	.1	---	3.6	2354	1.7
30	0616	6.0	2035	-.4	1417	3.6	---	---
31	0639	1.9	---	6.2	---	-.8	2035	3.7

* -- TIDE OCCURS ON NEXT DATE.

TABLE 27

SAN NICOLAS ISLAND TIDES

DECEMBER 1983

33 DEC 16 MIN N, 119 DEG 30 MIN U - CENTRAL PART NE COAST

DATE	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT	TIME PST	HGT FT
1	0033	.8	0650	5.6	1343	-2	1938	3.9
2	0111	1.1	0721	5.8	1425	-.5	2031	3.8
3	0143	1.4	0753	6.0	1507	-.8	2117	3.7
4	0218	1.6	0826	5.9	1546	-.9	2204	3.5
5	0250	1.9	0858	5.8	1625	-.8	2254	3.5
6	0322	2.2	0930	5.6	1707	-.5	2343	3.3
7	0358	2.5	1003	5.3	1752	-.3	---	---
8	0442	3.2	1043	2.6	1839	4.9	1839	0.0
9	0515	3.2	1120	2.9	1928	4.5	1928	.3
10	0506	3.3	1152	3.0	2024	4.0	2024	.5
11	0408	3.5	1228	2.9	2118	3.5	2118	.7
12	0506	3.7	1301	2.5	2207	3.3	2207	1.0
13	0531	4.1	1331	2.0	2250	3.1	2250	1.2
14	0559	4.4	1402	1.5	2328	3.1	2328	1.3
15	0624	4.7	1434	.8	---	3.2	---	1.5*
16	0655	5.1	1508	.3	1930	3.4	1930	3.5
17	0725	5.5	1575	5.7	2017	3.3	2017	3.5
18	0802	6.0	1612	6.0	2103	3.5	2103	3.5
19	0840	6.1	1658	6.1	2148	3.5	2148	3.5
20	0922	6.9	1744	5.9	2238	3.5	2238	3.5
21	1008	7.3	1837	5.5	2327	3.5	2327	3.5
22	1059	7.4	1933	5.5	---	3.5	---	---
23	1156	7.4	2029	5.5	1837	5.5	1837	5.5
24	1255	7.4	2127	5.5	1933	5.5	1933	5.5
25	1343	7.4	2222	5.5	2029	5.5	2029	5.5
26	1437	7.4	2316	5.5	2127	5.5	2127	5.5
27	1534	7.4	---	5.5	2222	5.5	2222	5.5
28	1637	7.4	1837	5.5	2316	5.5	2316	5.5
29	1743	7.4	1933	5.5	---	5.5	---	5.5*
30	1855	7.4	2029	5.5	1837	5.5	1837	5.5
31	1954	7.4	2127	5.5	1933	5.5	1933	5.5

* -- TIDE OCCURS ON NEXT DATE.

POINT HUGO TIDES

DECEMBER 1983

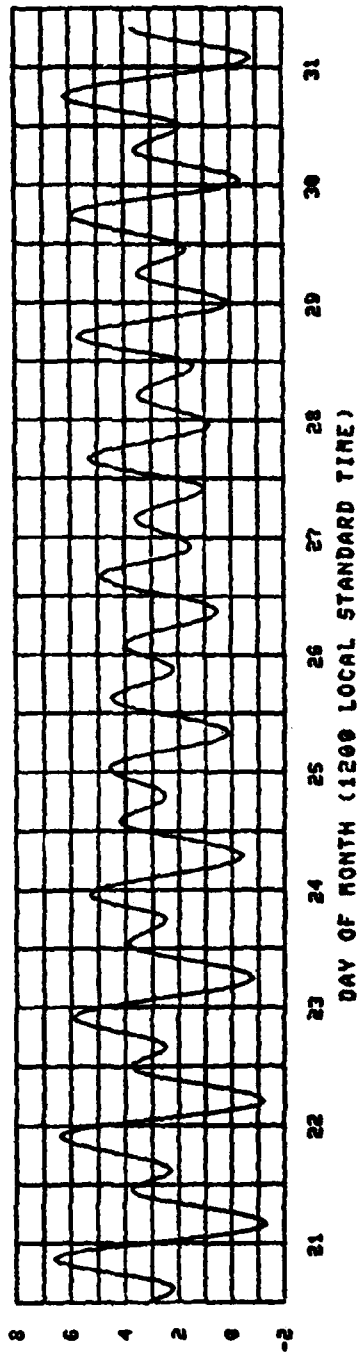
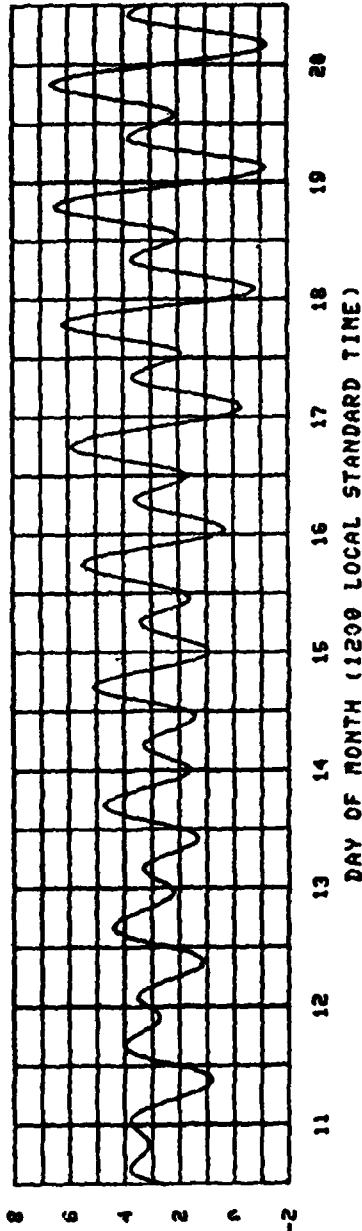
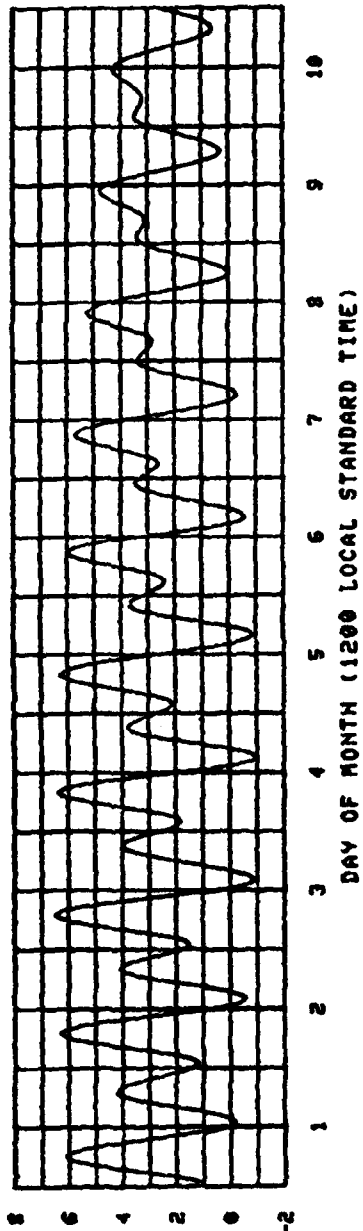


Table 28. Moonrise and Moonset, Barking Sands, Hawaii, 1963.

Date	January		February		March		April		May		June		Date
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	
1	2102	0937	2250	1027	2131	0858	2302	0929	2332	0939	-----	1057	1
2	2206	1028	2346	1106	2228	0937	2357	1013	-----	1029	0024	1149	2
3	2307	1113	-----	1143	2324	1015	-----	1059	0021	1121	0101	1240	3
4	-----	1153	0040	1221	-----	1055	0050	1148	0106	1213	0138	1331	4
5	0006	1231	0134	1300	0019	1137	0140	1239	0148	1306	0210	1422	5
6	0100	1308	0228	1341	0113	1221	0227	1330	0227	1367	0245	1516	6
7	0154	1344	0320	1426	0206	1307	0311	1423	0303	1449	0321	1611	7
8	0247	1422	0412	1513	0257	1356	0351	1515	0338	1541	0400	1710	8
9	0340	1501	0502	1602	0346	1447	0429	1607	0413	1634	0443	1813	9
10	0432	1543	0550	1653	0432	1539	0506	1659	0449	1729	0532	1918	10
11	0525	1628	0635	1745	0514	1631	0541	1752	0527	1827	0628	2024	11
12	0616	1716	0716	1837	0554	1723	0616	1846	0608	1928	0729	2127	12
13	0706	1806	0755	1929	0631	1816	0653	1942	0653	2031	0835	2225	13
14	0753	1858	0831	2021	0707	1908	0731	2040	0745	2135	0941	2317	14
15	0836	1950	0907	2113	0742	2000	0813	2140	0841	2238	1046	-----	15
16	0917	2042	0941	2206	0817	2054	0800	2242	0843	2338	1148	0004	16
17	0954	2133	1016	2258	0854	2149	0852	2344	0947	-----	1248	0046	17
18	1030	2224	1053	2354	0933	2247	1049	-----	1151	0032	1345	0125	18
19	1106	2316	1133	-----	1016	2346	1151	0045	1254	0121	1441	0202	19
20	1140	-----	1218	0052	1103	-----	1254	0142	1354	0205	1536	0239	20
21	1216	0009	1308	0153	1156	0048	1358	0234	1453	0245	1632	0317	21
22	1255	0103	1404	0255	1255	0149	1500	0321	1549	0323	1727	0357	22
23	1337	0201	1506	0359	1358	0249	1601	0404	1646	0401	1822	0440	23
24	1425	0302	1613	0459	1503	0346	1700	0445	1742	0438	1916	0526	24
25	1520	0406	1720	0556	1608	0438	1758	0524	1838	0517	2008	0614	25
26	1622	0512	1827	0648	1711	0525	1855	0602	1934	0559	2057	0705	26
27	1728	0617	1931	0734	1813	0608	1952	0641	2030	0643	2141	0758	27
28	1837	0718	2032	0817	1913	0649	2049	0722	2124	0731	2222	0850	28
29	1945	0813	-----	-----	2012	0729	2145	0805	2214	0821	2300	0942	29
30	2050	0902	-----	-----	2109	0808	2240	0850	2301	0912	2335	1033	30
31	2151	0946	-----	-----	2206	0848	-----	-----	2344	1005	-----	-----	31

Date	July		August		September		October		November		December		Date
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	
1	-----	1123	-----	1243	0039	1431	0128	1518	0333	1615	0421	1610	1
2	0009	1214	0028	1340	0135	1533	0234	1609	0434	1654	0520	1651	2
3	0042	1305	0109	1439	0238	1633	0340	1656	0534	1734	0619	1734	3
4	0117	1358	0157	1542	0344	1729	0445	1740	0634	1814	0718	1822	4
5	0153	1454	0251	1647	0452	1820	0548	1821	0734	1857	0816	1913	5
6	0233	1554	0352	1750	0600	1906	0650	1901	0834	1943	0911	2005	6
7	0319	1657	0459	1850	0705	1949	0751	1941	0932	2032	1002	2059	7
8	0411	1802	0608	1944	0808	2030	0851	2023	1029	2124	1048	2153	8
9	0510	1908	0716	2033	0909	2110	0951	2107	1122	2217	1130	2246	9
10	0614	2010	0822	2117	1008	2150	1049	2154	1210	2310	1208	2337	10
11	0723	2107	0925	2156	1107	2232	1148	2243	1254	-----	1243	-----	11
12	0831	2157	1026	2237	1205	2316	1240	2335	1334	0003	1316	0027	12
13	0937	2243	1124	2316	1301	-----	1330	-----	1410	0055	1348	0117	13
14	1039	2324	1221	2355	1355	0003	1416	0027	1444	0148	1421	0207	14
15	1139	-----	1317	-----	1447	0052	1458	0120	1518	0236	1456	0259	15
16	1236	0002	1413	0037	1535	0143	1536	0212	1551	0327	1533	0353	16
17	1332	0040	1508	0121	1619	0235	1612	0304	1625	0418	1616	0450	17
18	1427	0118	1600	0208	1659	0327	1646	0355	1701	0512	1704	0551	18
19	1523	0157	1650	0257	1737	0419	1719	0445	1741	0608	1759	0654	19
20	1618	0239	1737	0348	1812	0511	1752	0536	1826	0707	1900	0758	20
21	1712	0323	1820	0440	1846	0601	1827	0628	1916	0808	2005	0900	21
22	1804	0411	1900	0533	1919	0652	1905	0722	2012	0911	2112	0957	22
23	1853	0501	1936	0624	1952	0743	1946	0819	2114	1012	2217	1048	23
24	1939	0552	2011	0716	2027	0835	2031	0918	2217	1110	2320	1134	24
25	2021	0645	2044	0805	2105	0928	2123	1018	2322	1203	-----	1215	25
26	2059	0737	2117	0855	2147	1025	2219	1119	-----	1251	0020	1254	26
27	2135	0828	2151	0946	2234	1123	2321	1218	0025	1334	0118	1332	27
28	2209	0919	2227	1036	2327	1223	-----	1314	0126	1414	0216	1409	28
29	2242	1009	2306	1132	-----	1324	0024	1405	0225	1453	0313	1449	29
30	2316	1059	2349	1229	0025	1423	0128	1452	0323	1531	0411	1531	30
31	2350	1150	-----	1329	-----	-----	0231	1535	-----	-----	0509	1616	31

TABLE 20
PORT ALLEN TIDES
JANUARY 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - MANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0511	2.3	1251	0.0	1727	.6	2239	-.1
2	0556	2.1	1337	0.0	1833	.6	2332	.1
3	0642	1.9	1424	0.0	1952	.7	----	----
4	0637	.4	0728	1.7	1506	0.0	2115	.8
5	0200	.6	0814	1.4	1548	0.0	2237	1.1
6	0356	.6	0905	1.2	1629	-.1	----	----
7	2337	1.3*	0555	.6	1004	.9	1706	-.1
8	0629	1.6	0728	.6	1109	.7	1743	-.1
9	0111	1.7	0834	.5	1208	.6	1820	-.1
10	0149	1.8	0922	.4	1304	.6	1856	-.1
11	0225	1.9	1001	.3	1349	.6	1934	-.1
12	0257	2.0	1033	.2	1431	.6	2006	-.1
13	0330	2.0	1105	.2	1510	.6	2041	-.1
14	0400	2.0	1137	.2	1545	.6	2113	-.1
15	0430	1.9	1205	.2	1623	.6	2148	0.0
16	0502	1.9	1233	.2	1707	.6	2220	.1
17	0531	1.8	1302	.1	1756	.6	2302	.2
18	0603	1.7	1334	.1	1853	.7	----	----
19	2351	.4*	0635	1.5	1403	.1	2002	.8
20	0059	.6	0713	1.3	1440	.1	2118	1.0
21	0240	.6	0758	1.1	1519	0.0	2234	1.3
22	0449	.6	0857	.9	1605	0.0	----	----
23	2333	1.5*	0642	.6	1013	.7	1650	-.1
24	0028	1.7	0758	.4	1136	.6	1744	-.2
25	0113	2.0	0851	.2	1245	.6	1836	-.3
26	0200	2.2	0934	.1	1345	.6	1926	-.3
27	0244	2.3	1014	0.0	1439	.6	2014	-.3
28	0328	2.3	1053	-.1	1529	.6	2103	-.3
29	0408	2.3	1132	-.1	1619	.7	2152	-.2
30	0450	2.1	1207	-.1	1712	.7	2241	-.1
31	0527	1.9	1243	-.1	1807	.8	----	----

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

JANUARY 1983

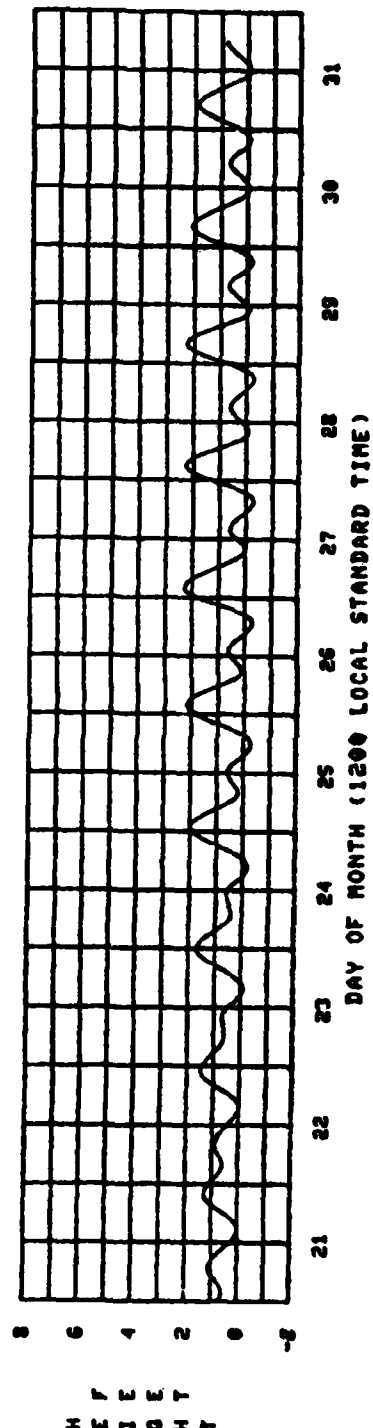
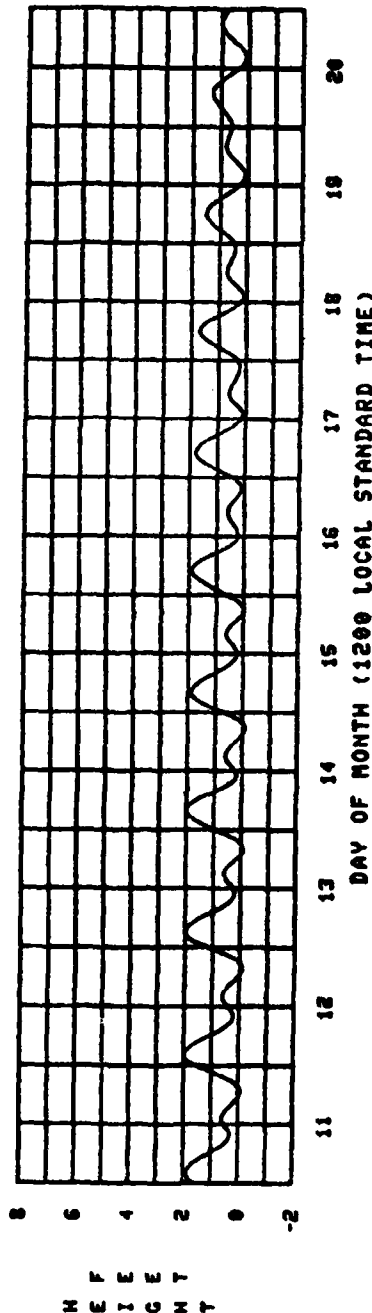
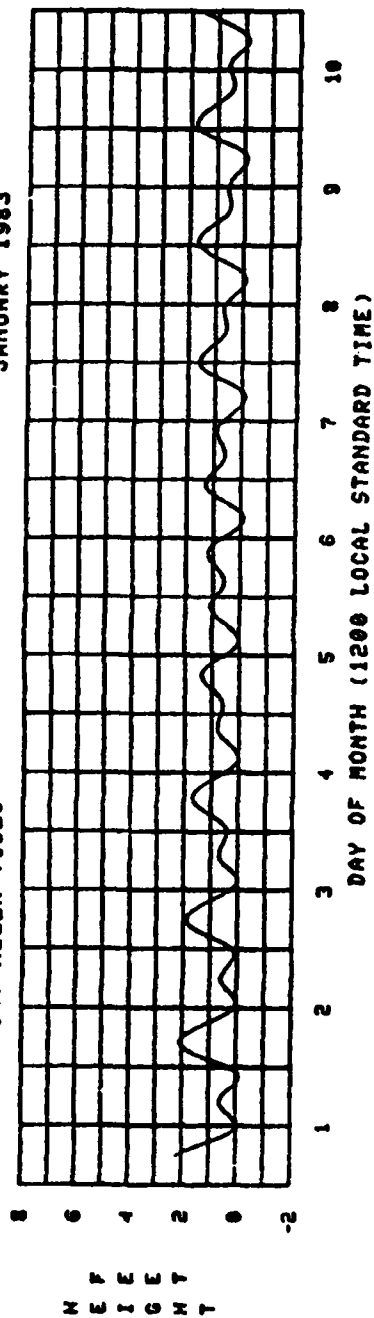


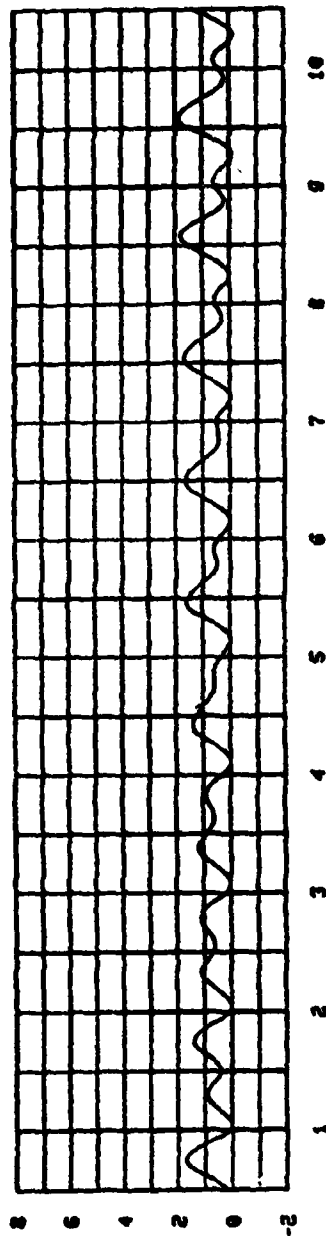
TABLE 30
PORT ALLEN TIDES
FEBRUARY 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - MANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	2336	.1*	0606	1.7	1318	0.0	1910	.9
2	0035	.4	0645	1.4	1356	0.0	2022	1.1
3	0158	.6	0723	1.1	1436	0.0	2138	1.2
4	0350	.6	0805	.9	1517	0.0	2253	1.4
5	0615	.6	0904	.6	1603	0.0	----	----
6	2353	1.6*	0750	.5	1637	.6	1656	0.0
7	0042	1.7	0835	.4	1200	.5	1749	0.0
8	0124	1.7	0910	.3	1300	.6	1836	0.0
9	0201	1.8	0936	.2	1345	.6	1919	-.1
10	0236	1.9	1001	.2	1424	.6	1957	-.1
11	0307	1.9	1026	.1	1500	.6	2036	-.1
12	0337	1.9	1048	.1	1535	.7	2111	-.1
13	0403	1.8	1113	.1	1607	.7	2146	0.0
14	0431	1.7	1137	.1	1646	.8	2225	.1
15	0458	1.7	1200	.1	1728	.9	2307	.2
16	0527	1.5	1225	.1	1817	1.0	----	----
17	2359	.4*	0555	1.3	1252	0.0	1915	1.1
18	0107	.5	0627	1.1	1324	0.0	2025	1.3
19	0247	.6	0709	.8	1408	0.0	2141	1.4
20	0511	.6	0812	.6	1505	0.0	2256	1.6
21	0654	.4	1001	.6	1610	0.0	----	----
22	2359	1.7*	0753	.3	1141	.5	1720	-.1
23	0052	1.9	0834	.1	1250	.6	1824	-.2
24	0141	2.1	0910	0.0	1347	.6	1920	-.2
25	0225	2.1	0942	-.1	1437	.7	2016	-.2
26	0306	2.1	1014	-.1	1522	.9	2104	-.2
27	0344	2.0	1046	-.1	1607	1.0	2154	-.1
28	0423	1.8	1118	-.1	1650	1.1	2245	0.0

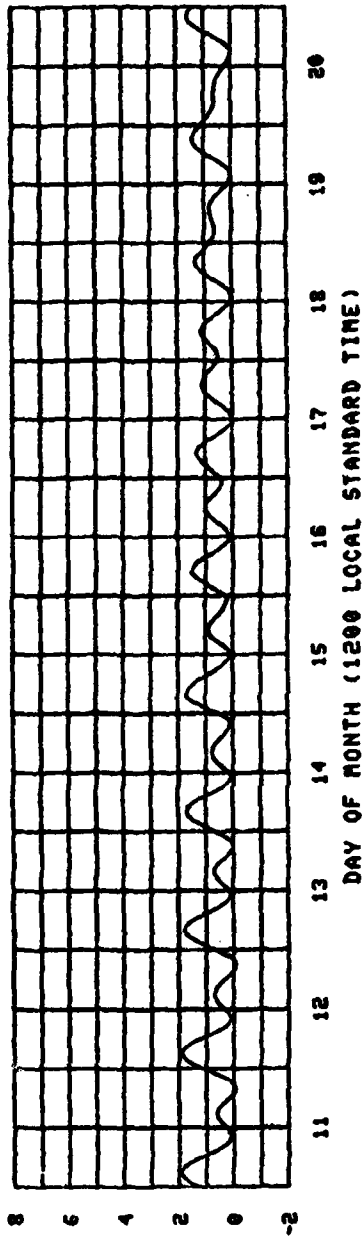
* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

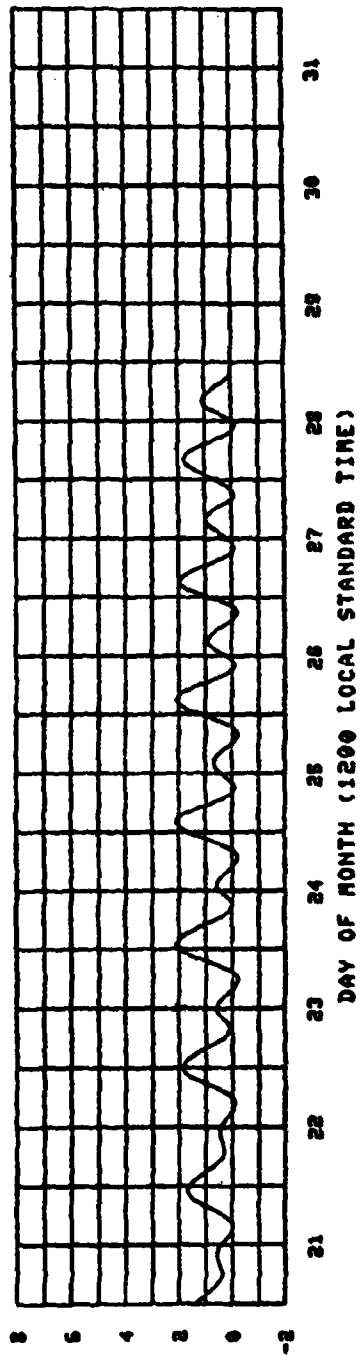
FEBRUARY 1983



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TABLE 31

PORT ALLEN TIDES

MARCH 1983

21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0458	1.6	1145	-.1	1739	1.2	----	---
2	2338	.2*	0533	1.4	1214	-.1	1833	1.3
3	0038	.4	0605	1.1	1243	0.0	1930	1.3
4	0202	.5	0637	.8	1318	0.0	2035	1.4
5	0355	.6	0719	.6	1401	.1	2151	1.4
6	0612	.5	0828	.6	1454	.2	2304	1.5
7	0724	.4	1040	.5	1608	.2	----	---
8	2359	1.6*	0759	.3	1207	.5	1719	.2
9	0047	1.7	0827	.2	1300	.6	1818	.1
10	0128	1.7	0850	.2	1338	.6	1906	.1
11	0203	1.7	0914	.1	1413	.7	1950	0.0
12	0235	1.7	0937	.1	1445	.9	2028	0.0
13	0304	1.7	0956	0.0	1517	1.0	2109	0.0
14	0329	1.7	1017	0.0	1549	1.1	2148	.1
15	0357	1.5	1038	0.0	1626	1.2	2231	.1
16	0423	1.4	1059	0.0	1705	1.3	2318	.2
17	0454	1.2	1124	0.0	1750	1.4	----	---
18	0017	.3	0526	1.0	1150	0.0	1843	1.5
19	0131	.5	0558	.8	1227	0.0	1946	1.5
20	0312	.5	0650	.6	1310	0.0	2101	1.6
21	0519	.4	0816	.5	1411	.1	2218	1.7
22	0635	.3	1033	.5	1541	.1	----	---
23	2326	1.7*	0720	.1	1201	.6	1710	.1
24	0024	1.3	0756	0.0	1301	.6	1820	0.0
25	0113	1.9	0830	-.1	1346	.8	1922	0.0
26	0158	1.8	0859	-.1	1430	1.0	2017	-.1
27	0240	1.7	0928	-.2	1509	1.2	2109	0.0
28	0316	1.6	0955	-.2	1552	1.4	2202	0.0
29	0351	1.4	1022	-.1	1631	1.5	2253	.1
30	0423	1.2	1045	-.1	1713	1.6	----	---
31	2348	.2*	0455	1.0	1110	-.1	1755	1.6

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

MARCH 1983

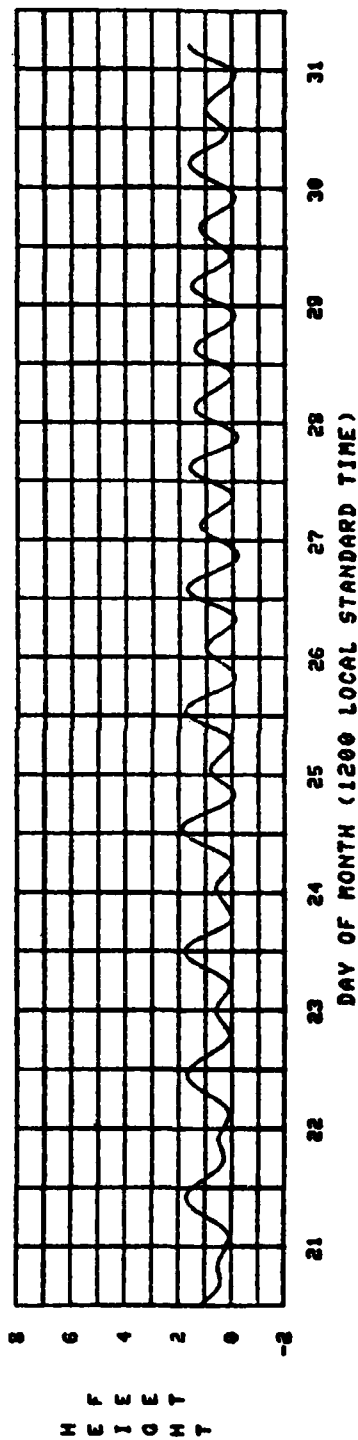
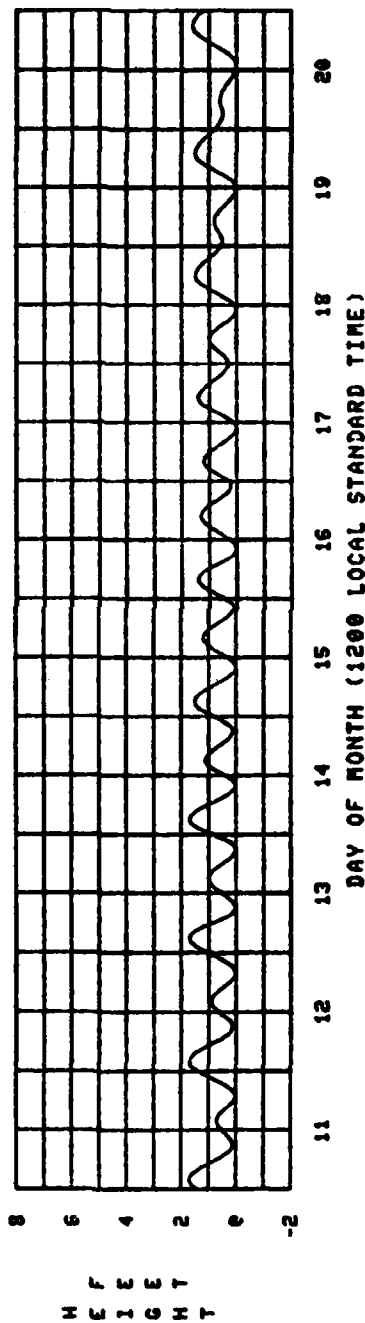
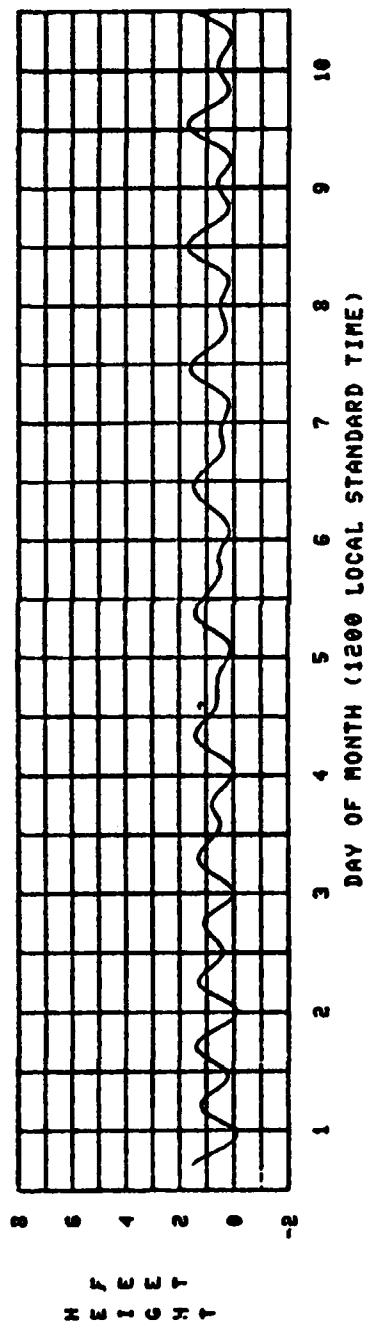


TABLE 32
PORT ALLEN TIDES
APRIL 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0050	.3	0526	.8	1134	0.0	1844	1.6
2	0207	.4	0605	.6	1206	.1	1942	1.6
3	0350	.4	0657	.5	1245	.2	2049	1.5
4	0529	.3	0840	.4	1341	.3	2200	1.5
5	0635	.3	1049	.5	1514	.3	2304	1.5
6	0705	.2	1201	.6	1646	.3	----	----
7	2357	1.6*	0731	.1	1244	.6	1755	.3
8	0039	1.6	0754	.1	1321	.8	1849	.2
9	0117	1.6	0818	0.0	1353	1.0	1940	.2
10	0149	1.5	0838	0.0	1423	1.1	2025	.1
11	0225	1.4	0858	-.1	1455	1.3	2108	.1
12	0254	1.3	0920	-.1	1530	1.5	2153	.1
13	0322	1.2	0939	-.1	1605	1.6	2244	.2
14	0357	1.0	1004	-.1	1644	1.7	----	----
15	2337	.2*	0429	.8	1031	-.1	1729	1.7
16	0042	.3	0507	.6	1103	-.1	1822	1.7
17	0158	.3	0553	.6	1140	0.0	1921	1.7
18	0331	.3	0709	.4	1230	.1	2029	1.7
19	0453	.2	0907	.4	1346	.2	2141	1.7
20	0556	.1	1059	.5	1526	.3	2249	1.7
21	0639	0.0	1207	.6	1702	.3	----	----
22	2348	1.7*	0713	-.1	1255	.9	1824	.2
23	0040	1.6	0742	-.2	1337	1.1	1926	.2
24	0123	1.5	0810	-.2	1419	1.4	2025	.1
25	0206	1.4	0838	-.2	1455	1.6	2120	.1
26	0243	1.2	0902	-.2	1533	1.7	2212	.1
27	0320	1.0	0926	-.2	1612	1.7	2307	.2
28	0353	.8	0951	-.2	1649	1.8	----	----
29	0000	.2	0425	.6	1017	-.1	1726	1.7
30	0059	.3	0502	.6	1042	0.0	1811	1.7

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

APRIL 1983

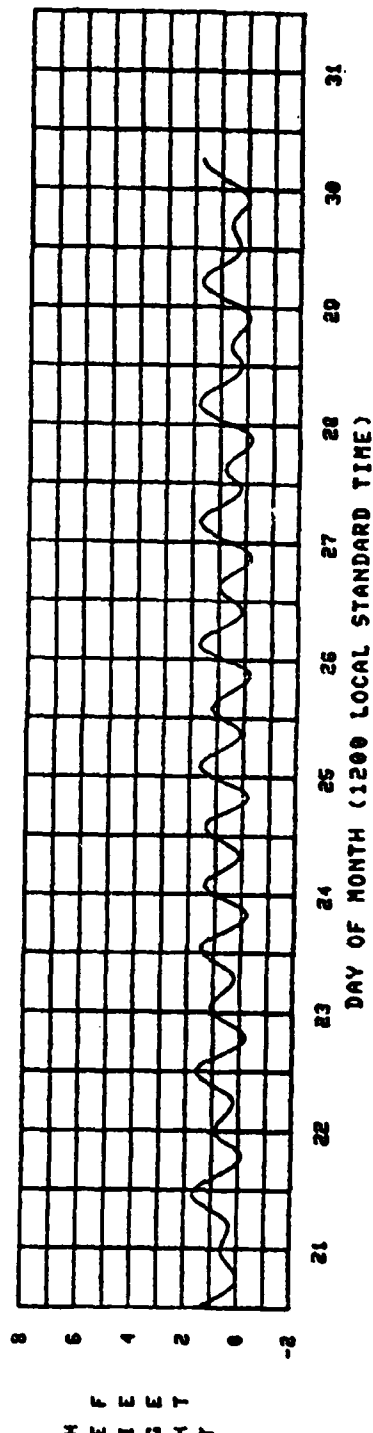
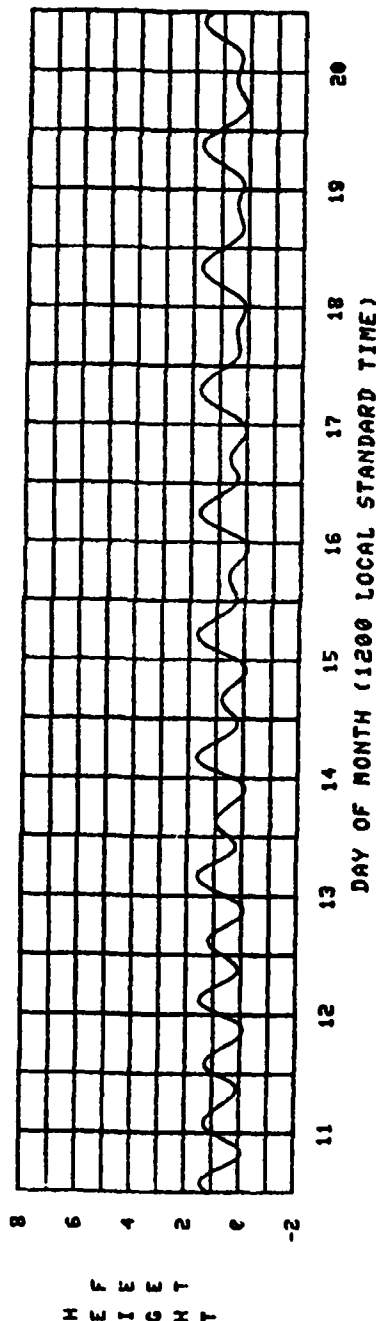
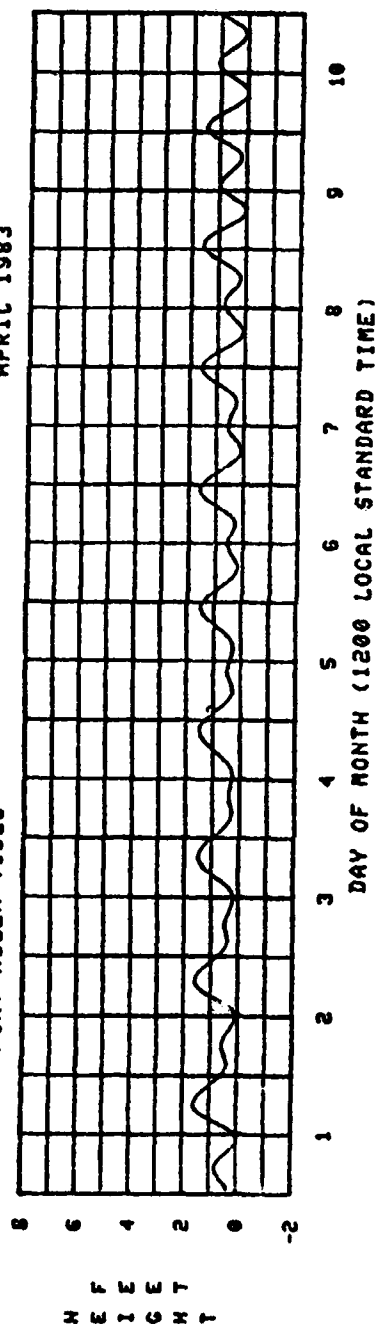


TABLE 33
PORT ALLEN TIDES
MAY 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0208	.3	0548	.5	1110	.1	1859	1.7
2	0320	.3	0654	.4	1149	.2	1955	1.6
3	0430	.2	0840	.4	1241	.3	2054	1.5
4	0522	.2	1034	.5	1414	.4	2155	1.5
5	0556	.1	1136	.6	1557	.5	2250	1.4
6	0626	.1	1221	.8	1723	.5	----	----
7	2339	1.4*	0650	0.0	1257	1.0	1829	.4
8	0021	1.3	0716	-.1	1329	1.2	1929	.3
9	0101	1.2	0738	-.1	1401	1.4	2022	.3
10	0137	1.1	0801	-.2	1436	1.7	2113	.2
11	0214	1.0	0825	-.2	1511	1.7	2207	.2
12	0251	.8	0854	-.2	1550	1.9	2259	.1
13	0331	.7	0923	-.3	1632	2.0	----	----
14	2355	.1*	0410	.6	0955	-.2	1716	2.0
15	0059	.1	0459	.5	1033	-.2	1806	2.0
16	0206	.1	0605	.4	1116	0.0	1903	1.9
17	0315	.1	0736	.4	1214	.1	2003	1.8
18	0418	0.0	0926	.5	1337	.3	2104	1.7
19	0506	-.1	1052	.6	1520	.4	2207	1.6
20	0547	-.1	1158	.9	1659	.5	2306	1.5
21	0620	-.2	1247	1.2	1826	.4	----	----
22	2359	1.3*	0652	-.2	1327	1.4	1938	.4
23	0046	1.1	0721	-.2	1404	1.7	2041	.3
24	0129	.9	0748	-.2	1442	1.7	2138	.3
25	0211	.8	0815	-.2	1517	1.9	2231	.2
26	0249	.6	0841	-.2	1553	1.9	2319	.2
27	0325	.6	0906	-.2	1628	1.9	----	----
28	0008	.2	0403	.5	0934	-.1	1704	1.9
29	0057	.2	0445	.5	1006	0.0	1745	1.8
30	0153	.2	0537	.4	1038	.1	1824	1.7
31	0240	.2	0645	.4	1117	.2	1909	1.7

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

MAY 1983

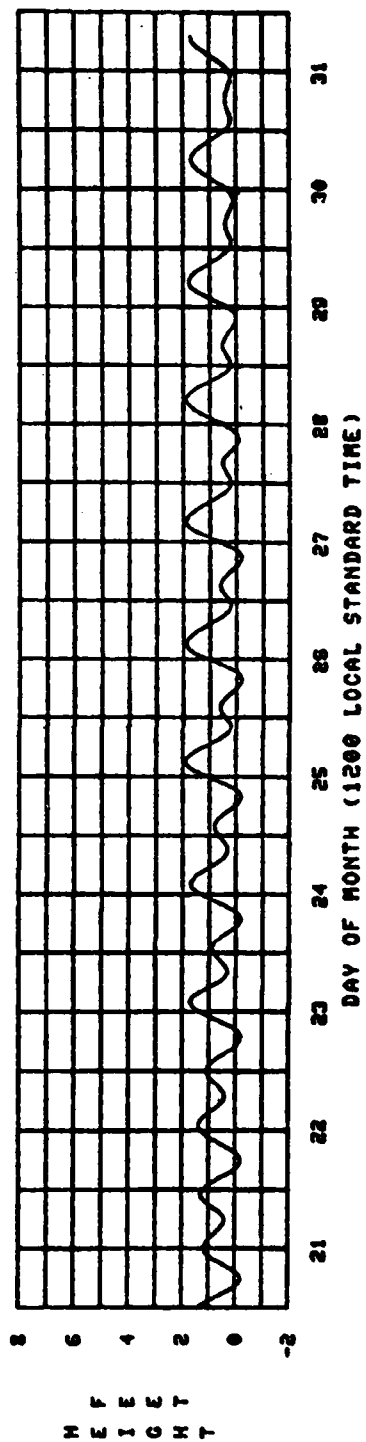
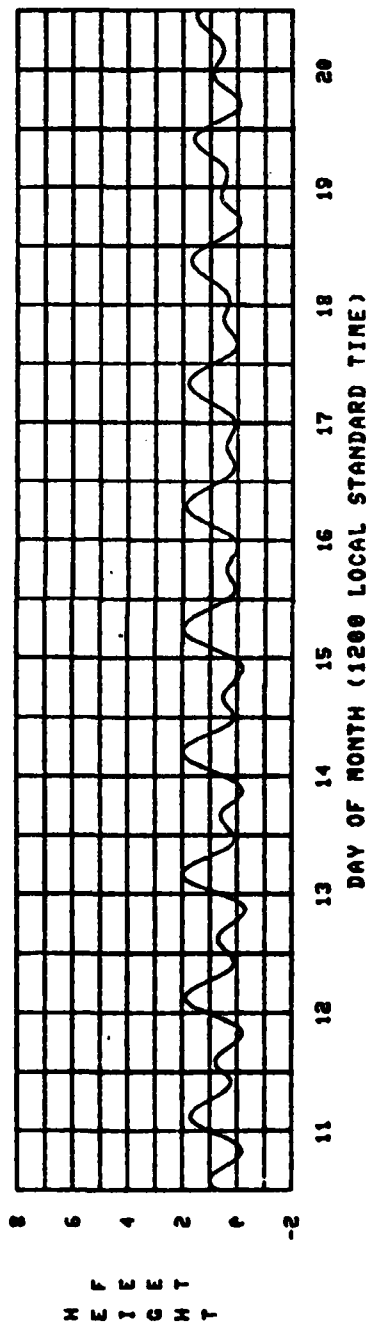
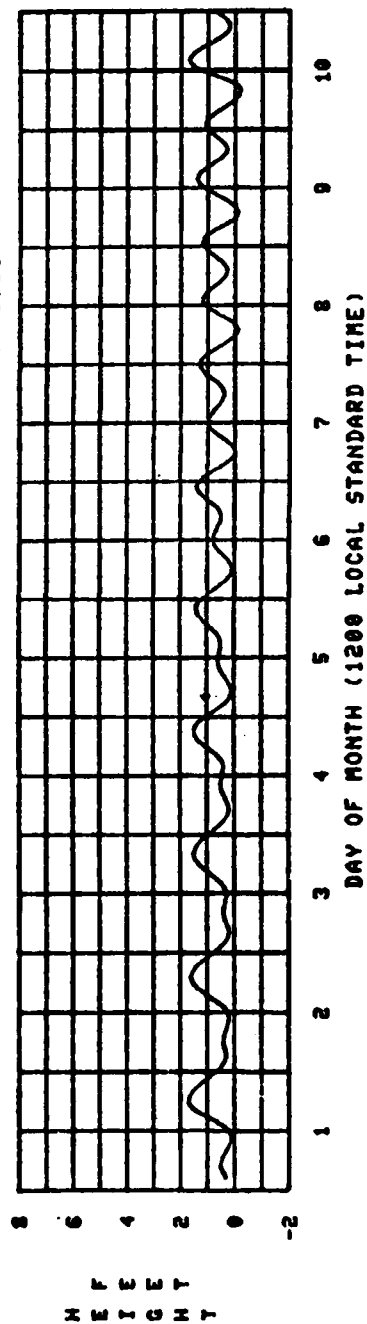


TABLE 34

PORT ALLEN TIDES

JUNE 1983

21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0329	.2	0813	.5	1206	.3	1956	1.6
2	0411	.1	0944	.6	1321	.5	2045	1.5
3	0446	.1	1057	.7	1504	.6	2137	1.4
4	0516	0.0	1146	.9	1648	.6	2230	1.2
5	0546	0.0	1223	1.2	1812	.6	----	----
6	2322	1.1*	0612	-.1	1300	1.4	1924	.5
7	0007	1.0	0639	-.2	1337	1.7	2024	.4
8	0053	.8	0711	-.2	1414	1.8	2123	.3
9	0142	.7	0743	-.3	1455	2.0	2215	.2
10	0225	.6	0816	-.3	1534	2.2	2309	.1
11	0316	.6	0854	-.3	1619	2.2	----	----
12	0400	.1	0905	.5	0936	-.3	1705	2.2
13	0055	0.0	0505	.5	1021	-.2	1753	2.2
14	0144	0.0	0614	.5	1113	0.0	1841	2.0
15	0240	0.0	0736	.6	1212	.2	1933	1.8
16	0328	-.1	0907	.6	1332	.4	2025	1.7
17	0413	-.1	1027	.9	1511	.6	2121	1.4
18	0452	-.1	1132	1.1	1704	.6	2216	1.2
19	0528	-.2	1227	1.4	1840	.6	2315	1.0
20	0602	-.2	1310	1.7	1958	.5	----	----
21	0007	.8	0634	-.2	1349	1.8	2101	.4
22	0100	-.7	0705	-.2	1427	1.9	2153	.3
23	0145	.6	0737	-.2	1503	2.0	2235	.3
24	0230	.6	0807	-.2	1536	2.0	2318	.2
25	0309	.5	0840	-.1	1610	2.0	----	----
26	2353	.2*	0340	.5	0912	-.1	1644	2.0
27	0035	.2	0431	.6	0947	0.0	1716	1.9
28	0112	.2	0521	.5	1023	.1	1753	1.8
29	0149	.2	0617	.6	1102	.2	1828	1.7
30	0221	.2	0726	.6	1150	.4	1904	1.7

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

JUNE 1983

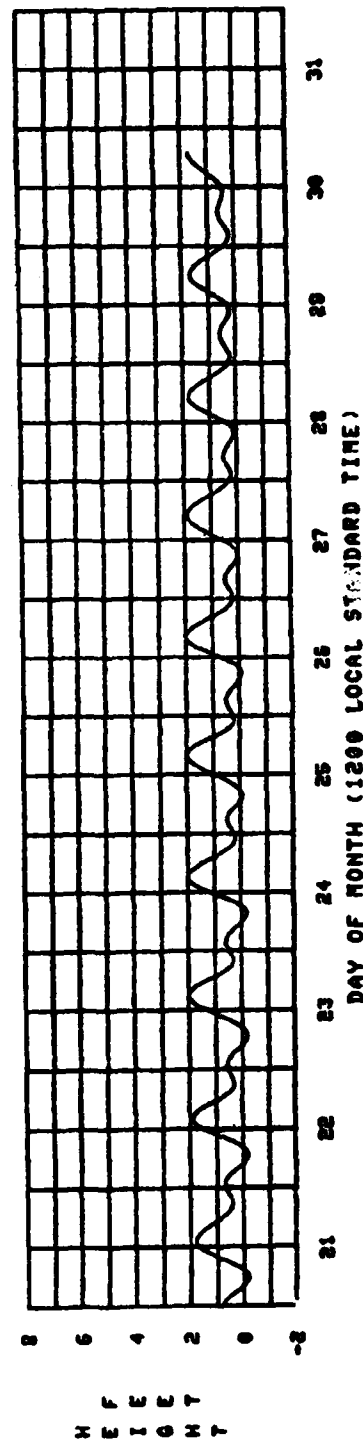
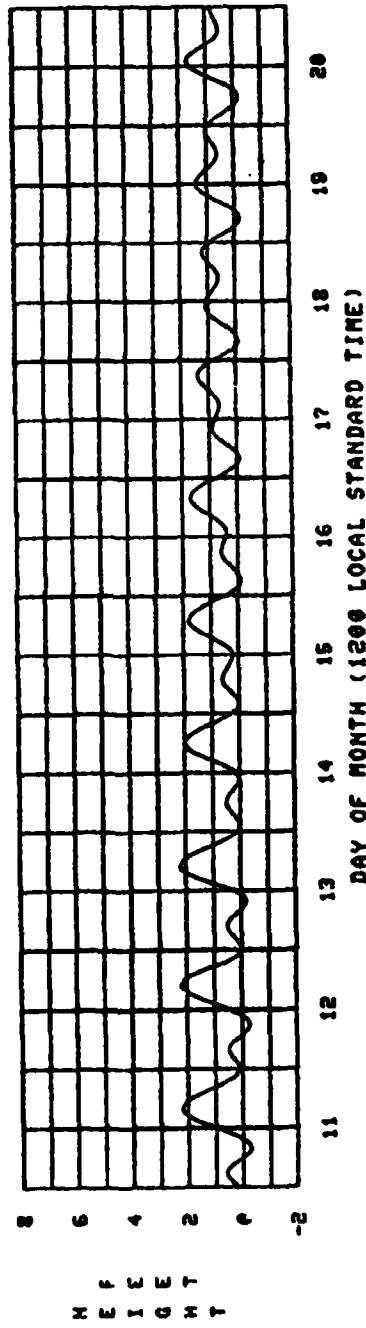
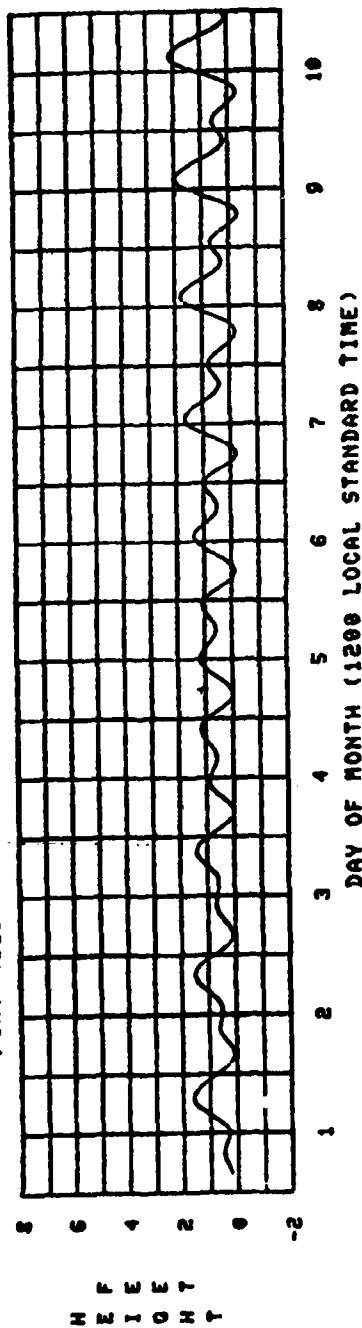


TABLE 36
PORT ALLEN TIDES
JULY 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0256	.1	0841	.7	1256	.6	1946	1.5
2	0331	.1	0958	.9	1426	.6	2028	1.3
3	0405	.1	1053	1.1	1620	.7	2123	1.1
4	0437	0.0	1145	1.4	1804	.6	2219	.9
5	0512	-.1	1231	1.7	1926	.6	----	----
6	2322	.8*	0551	-.1	1313	1.8	2029	.4
7	0024	.6	0632	-.2	1355	2.1	2124	.3
8	0119	.6	0713	-.3	1437	2.2	2213	.2
9	0215	.6	0756	-.3	1521	2.4	2259	.1
10	0307	.6	0842	-.3	1605	2.4	----	----
11	2341	.1*	0902	.6	0930	-.2	1647	2.3
12	0024	0.0	0900	.6	1020	-.1	1733	2.2
13	0107	0.0	0603	.7	1113	.1	1815	2.0
14	0147	0.0	0715	.8	1217	.3	1901	1.7
15	0229	0.0	0831	.9	1333	.6	1947	1.5
16	0310	0.0	0947	1.2	1517	.6	2035	1.2
17	0352	0.0	1100	1.4	1715	.7	2131	1.0
18	0433	0.0	1159	1.6	1905	.6	2237	.8
19	0514	0.0	1244	1.7	2017	.5	----	----
20	2343	.6*	0556	0.0	1329	1.9	2109	.4
21	0047	.6	0635	0.0	1407	2.0	2148	.4
22	0137	.6	0714	0.0	1443	2.1	2223	.3
23	0220	.6	0753	0.0	1518	2.1	2252	.3
24	0300	.6	0828	0.0	1549	2.1	2324	.3
25	0339	.6	0903	0.0	1620	2.0	----	----
26	2348	.3*	0917	.6	0936	.1	1649	1.9
27	0017	.2	0959	.7	1017	.2	1717	1.8
28	0043	.2	0543	.8	1056	.3	1746	1.7
29	0111	.2	0639	.8	1142	.5	1821	1.6
30	0141	.2	0735	1.0	1247	.6	1854	1.4
31	0213	.2	0845	1.1	1413	.7	1935	1.2

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

JULY 1983

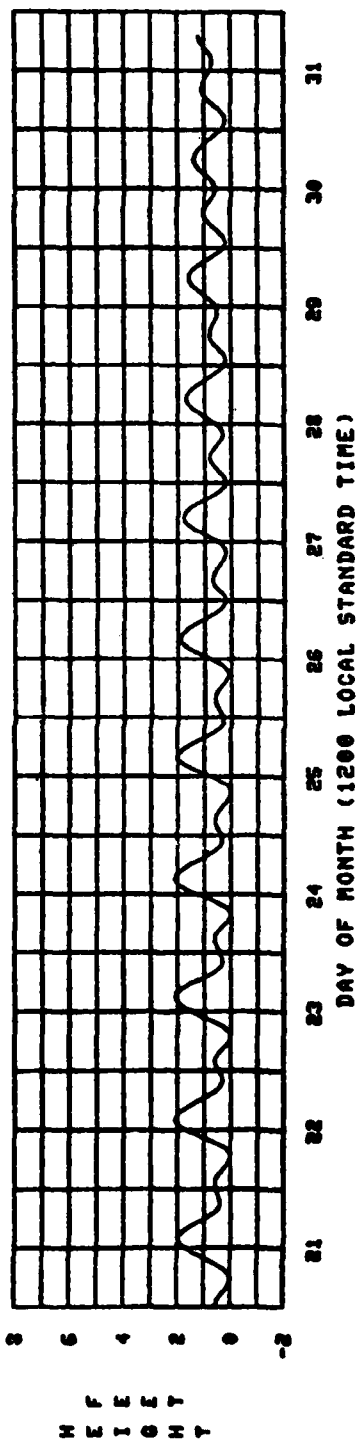
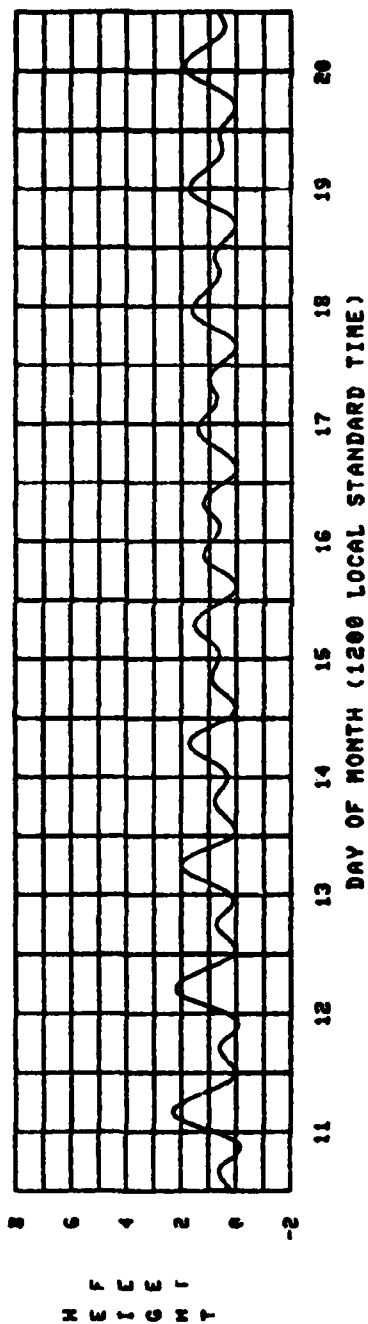
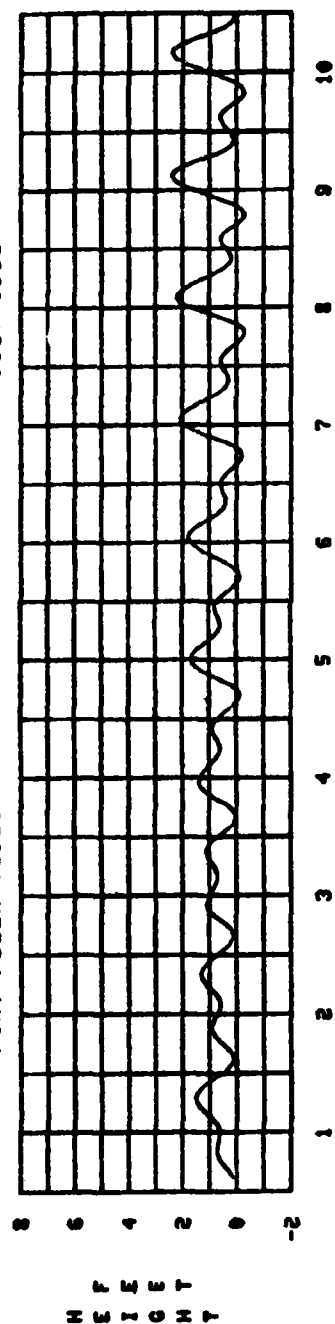


TABLE 38
PORT ALLEN TIDES
AUGUST 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - MANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0248	.2	1000	1.3	1612	.7	2024	1.0
2	0331	.1	1103	1.6	1812	.7	2133	.8
3	0419	.1	1157	1.7	1934	.6	2259	.7
4	0512	0.0	1247	2.0	2027	.4	----	----
5	0615	.6	0606	-.1	1335	2.2	2109	.3
6	0117	.6	0659	-.1	1420	2.3	2148	.2
7	0212	.7	0751	-.2	1504	2.4	2226	.1
8	0302	.8	0843	-.2	1543	2.4	2302	.1
9	0353	.9	0932	-.1	1626	2.3	----	----
10	2340	.1*	0444	1.0	1024	.1	1707	2.1
11	0014	.1	0541	1.1	1116	.2	1744	1.8
12	0050	.1	0640	1.2	1222	.5	1825	1.6
13	0125	.1	0748	1.3	1339	.6	1903	1.3
14	0202	.1	0901	1.5	1523	.7	1949	1.0
15	0246	.2	1014	1.6	1733	.7	2051	.8
16	0334	.2	1122	1.7	1913	.6	2221	.7
17	0429	.2	1215	1.8	2009	.5	----	----
18	2347	.6*	0527	.2	1303	1.9	2047	.4
19	0048	.6	0620	.2	1343	2.0	2118	.4
20	0136	.7	0705	.1	1419	2.0	2141	.4
21	0212	.8	0745	.1	1451	2.0	2206	.3
22	0246	.8	0826	.1	1521	2.0	2231	.3
23	0322	.9	0858	.2	1548	1.9	2252	.3
24	0357	1.0	0937	.2	1614	1.8	2315	.3
25	0433	1.1	1015	.3	1643	1.7	----	----
26	2337	.3*	0512	1.2	1059	.4	1710	1.6
27	0001	.3	0557	1.3	1146	.6	1739	1.4
28	0026	.3	0649	1.4	1252	.6	1811	1.2
29	0056	.3	0752	1.5	1423	.7	1849	1.0
30	0136	.3	0904	1.6	1629	.7	1948	.8
31	0228	.3	1017	1.7	1820	.6	2128	.7

* -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

AUGUST 1983

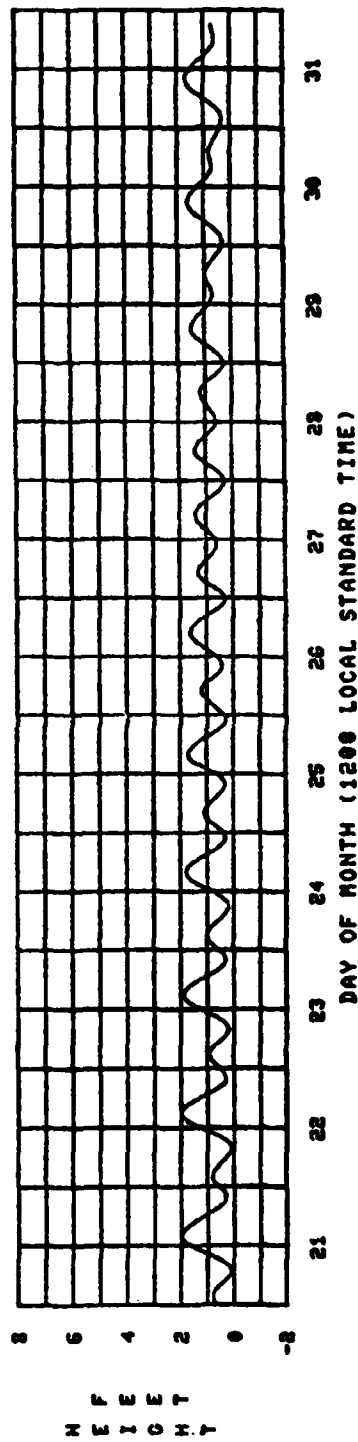
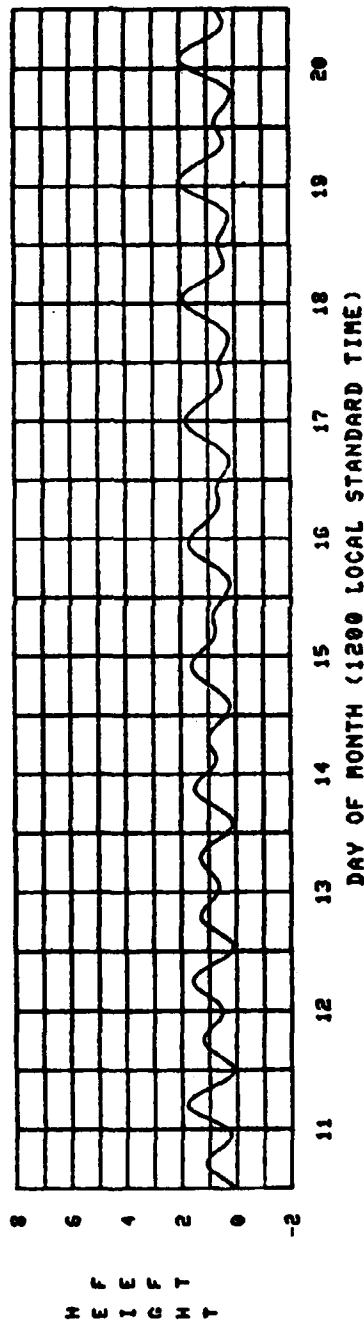
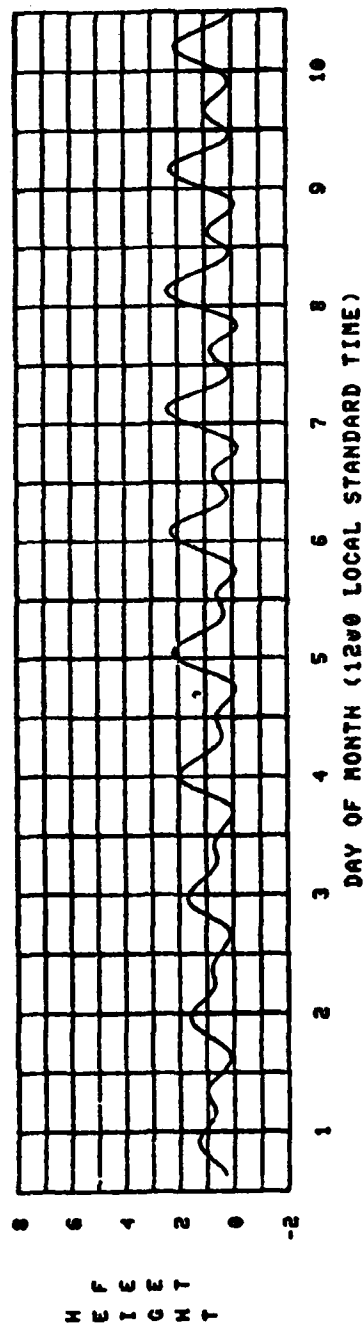


TABLE 37
PORT ALLEN TIDES
SEPTEMBER 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0334	.2	1125	1.9	1922	.5	2307	.6
2	0446	.2	1221	2.1	2004	.4	----	----
3	0023	.7	0554	.1	1311	2.2	2037	.3
4	0120	.8	0655	0.0	1357	2.3	2112	.2
5	0209	1.0	0752	0.0	1439	2.2	2144	.1
6	0255	1.1	0841	0.0	1519	2.1	2216	.1
7	0341	1.3	0935	.1	1558	2.0	2247	.1
8	0430	1.4	1029	.2	1635	1.7	2316	.1
9	0515	1.5	1125	.4	1710	1.6	----	----
10	0606	1.6	1221	1.6	1749	1.3	1749	1.3
11	0651	.2	0703	1.7	1825	1.0	1825	1.0
12	0051	.3	0809	1.7	1910	.8	1910	.8
13	0133	.3	0921	1.7	2042	.7	2042	.7
14	0230	.4	1033	1.7	2237	.6	2237	.6
15	0347	.4	1137	1.8	1933	.5	----	----
16	0457	.7*	0502	.4	2005	.4	2005	.4
17	0647	.8	0605	.4	2030	.4	2030	.4
18	0128	.9	0653	.3	2052	.3	2052	.3
19	0157	1.0	0737	.3	2113	.3	2113	.3
20	0232	1.2	0819	.3	2132	.3	2132	.3
21	0304	1.3	0856	.3	2153	.3	2153	.3
22	0336	1.4	0938	.3	2212	.2	2212	.2
23	0408	1.5	1020	.4	2232	.2	2232	.2
24	0446	1.6	1106	.5	2254	.2	2254	.2
25	0527	1.7	1200	.6	2321	.2	2321	.2
26	0614	1.7	1313	.6	1738	1.0	----	----
27	0703	.3*	0713	1.7	1449	.6	1820	.8
28	0833	.3	0822	1.7	1642	.6	1947	.6
29	0135	.4	0941	1.8	1805	.5	2200	.6
30	0301	.4	1051	1.9	1847	.4	----	----

* -- TIDE OCCURS ON PREVIOUS DATE

PORT ALLEN TIDES

SEPTEMBER 1983

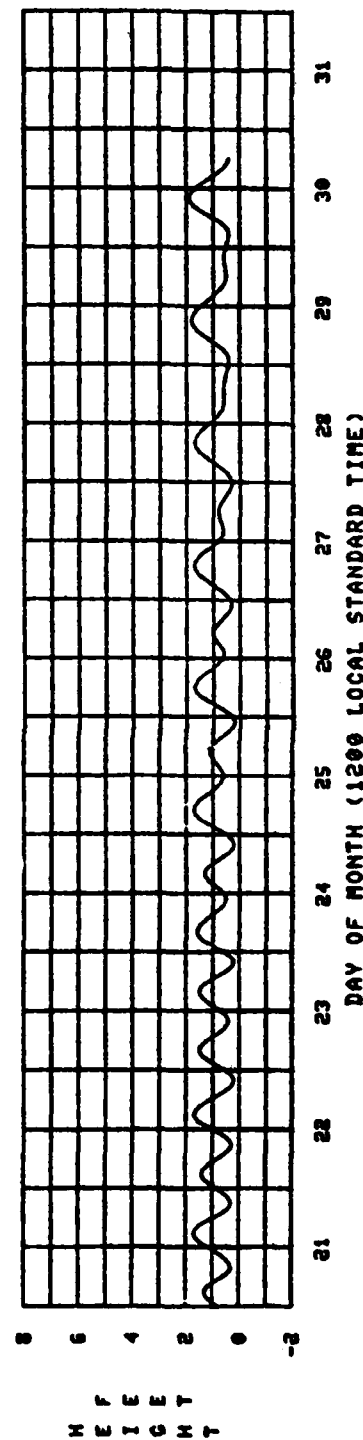
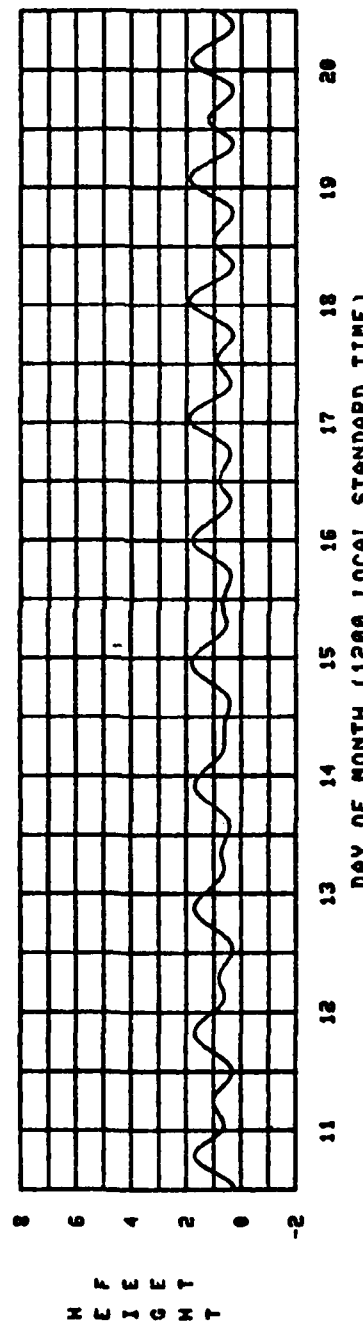
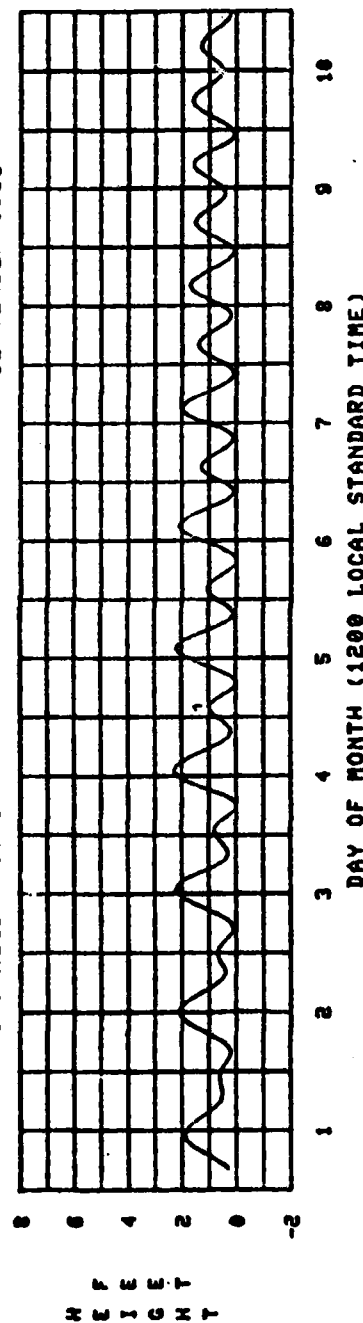


TABLE 38
PORT ALLEN TIDES
OCTOBER 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	2331	.7*	0433	.4	1151	2.0	1926	.2
2	0034	.9	0551	.3	1243	2.0	1957	.2
3	0119	1.1	0656	.3	1328	2.0	2029	.1
4	0202	1.3	0754	.2	1410	1.9	2058	0.0
5	0244	1.5	0849	.2	1449	1.7	2125	0.0
6	0326	1.7	0942	.2	1527	1.6	2151	0.0
7	0407	1.8	1038	.3	1603	1.4	2218	.1
8	0450	1.8	1136	.4	1638	1.1	2244	.1
9	0535	1.9	1240	.5	1713	.9	2313	.2
10	0624	1.8	1357	.6	1755	.7	----	----
11	2342	.3*	0720	1.8	1536	.6	1855	.6
12	0019	.4	0827	1.7	1712	.5	2048	.6
13	0114	.5	0936	1.7	1805	.5	2252	.6
14	0250	.6	1041	1.7	1844	.4	----	----
15	2355	.8*	0430	.6	1133	1.7	1909	.3
16	0036	.9	0542	.6	1219	1.7	1932	.3
17	0113	1.1	0641	.5	1258	1.7	1956	.2
18	0141	1.3	0730	.5	1333	1.7	2014	.2
19	0212	1.4	0814	.4	1401	1.6	2036	.1
20	0242	1.6	0859	.4	1433	1.4	2056	.1
21	0314	1.7	0942	.4	1458	1.3	2115	.1
22	0349	1.8	1028	.4	1531	1.1	2137	.1
23	0426	1.9	1120	.4	1602	1.0	2204	.1
24	0506	1.9	1219	.5	1637	.8	2232	.1
25	0552	2.0	1335	.5	1723	.7	2308	.2
26	0647	1.9	1505	.5	1829	.6	----	----
27	2350	.3*	0752	1.9	1626	.4	2027	.6
28	0059	.4	0903	1.9	1722	.3	2227	.6
29	0238	.5	1010	1.8	1808	.2	----	----
30	2337	.8*	0428	.5	1113	1.8	1840	.1
31	0031	1.1	0551	.5	1207	1.7	1912	0.0

* -- TIDE OCCURS ON PREVIOUS DATE.

FORT ALLEN TIDES

OCTOBER 1983

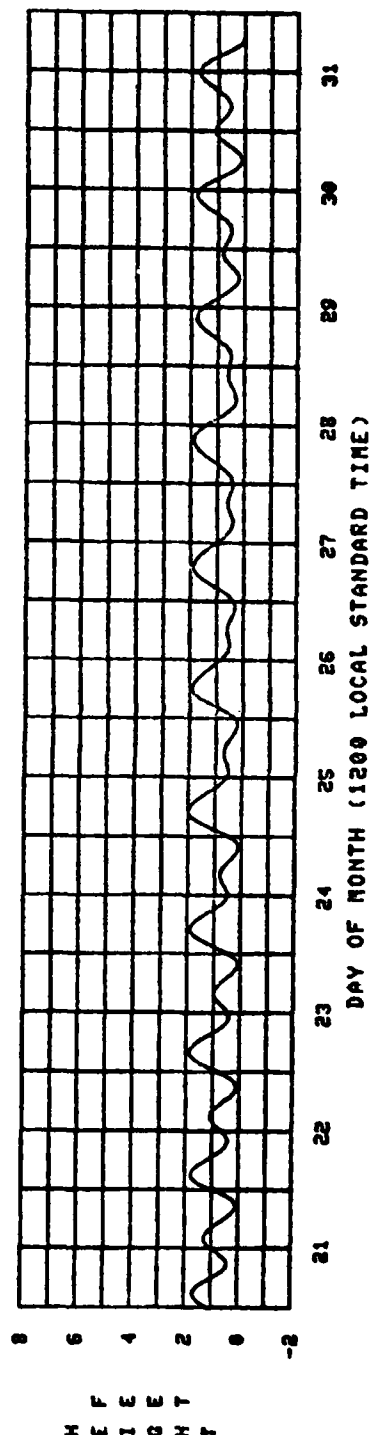
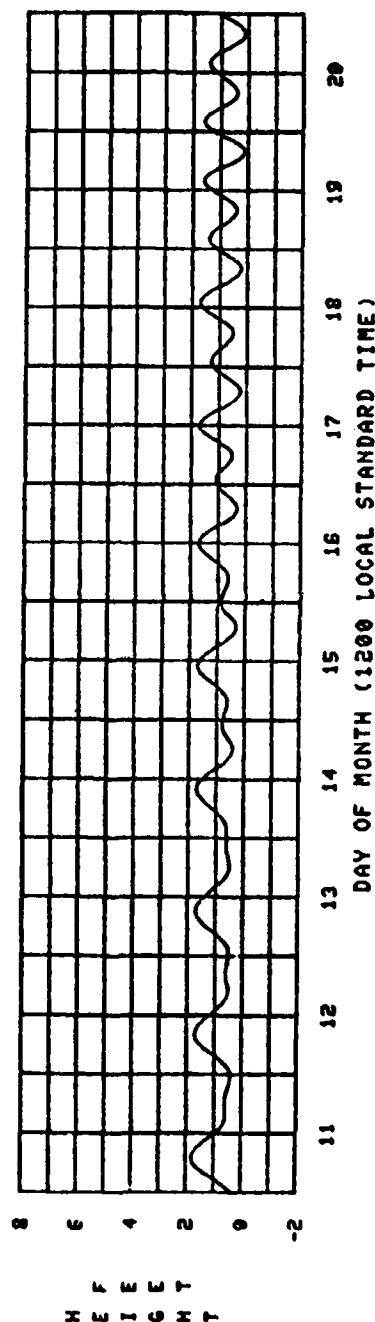
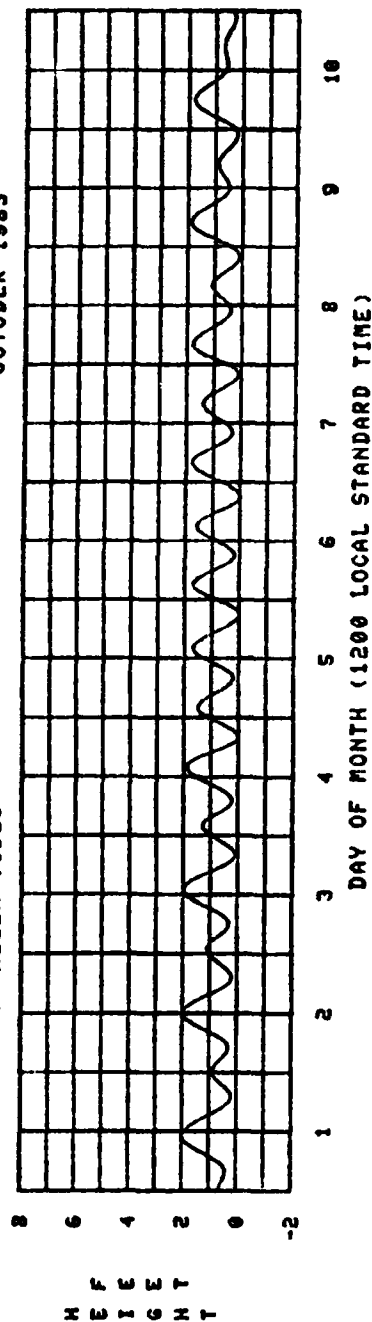


TABLE 39
PORT ALLEN TIDES
NOVEMBER 1983
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0113	1.4	0703	.4	1252	1.7	1942	0.0
2	0155	1.6	0804	.4	1335	1.5	2009	-.1
3	0235	1.7	0902	.3	1417	1.3	2035	-.1
4	0313	1.9	0956	.3	1456	1.1	2102	-.1
5	0352	2.0	1051	.3	1534	.9	2128	0.0
6	0428	2.1	1147	.4	1609	.8	2153	0.0
7	0510	2.1	1253	.4	1644	.6	2222	.1
8	0552	2.0	1355	.4	1734	.6	2247	.2
9	0640	1.9	1511	.4	1841	.6	2326	.3
10	0734	1.8	1617	.4	2034	.6	-----	---
11	0811	.5	0833	1.7	1702	.3	2231	.6
12	0144	.6	0933	1.7	1738	.3	-----	---
13	2333	.8*	0341	.6	1027	1.6	1807	.2
14	0012	1.0	0510	.6	1119	1.5	1831	.1
15	0047	1.2	0623	.6	1159	1.4	1856	.1
16	0119	1.4	0722	.6	1241	1.3	1919	0.0
17	0151	1.6	0813	.5	1316	1.2	1940	0.0
18	0223	1.7	0904	.4	1354	1.1	2004	-.1
19	0255	1.9	0954	.4	1429	.9	2030	-.1
20	0330	2.0	1042	.3	1505	.8	2059	-.1
21	0409	2.1	1135	.3	1543	.7	2131	-.1
22	0451	2.2	1234	.3	1629	.6	2203	0.0
23	0540	2.2	1336	.3	1727	.6	2245	.1
24	0629	2.1	1442	.2	1849	.5	2334	.2
25	0726	2.0	1541	.2	2035	.6	-----	---
26	0847	.4	0827	1.8	1630	.1	2219	.7
27	0226	.6	0926	1.7	1715	0.0	-----	---
28	2328	1.0*	0421	.6	1029	1.6	1750	-.1
29	0017	1.3	0559	.6	1125	1.4	1824	-.1
30	0102	1.6	0717	.5	1216	1.2	1855	-.2

* -- TIDE OCCURS ON PREVIOUS DATE.

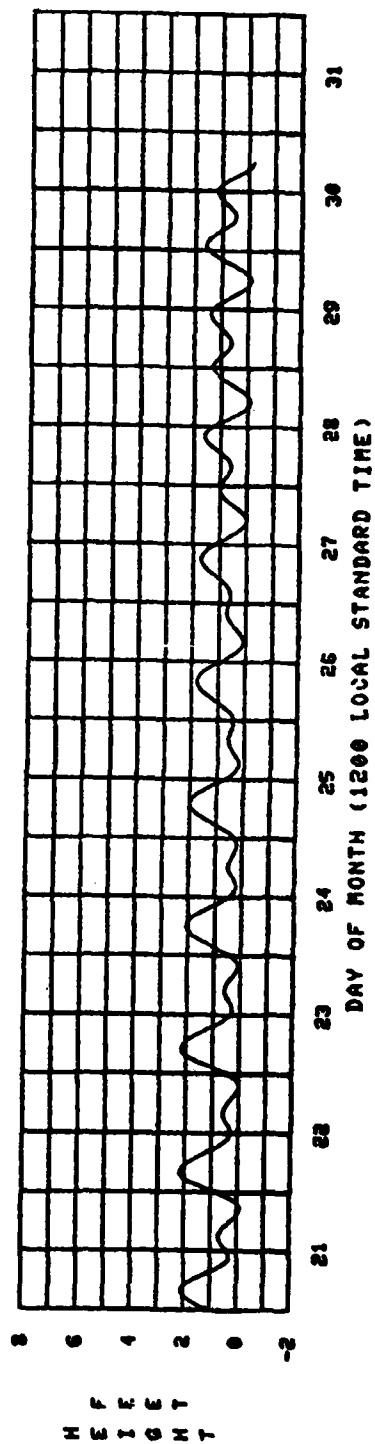
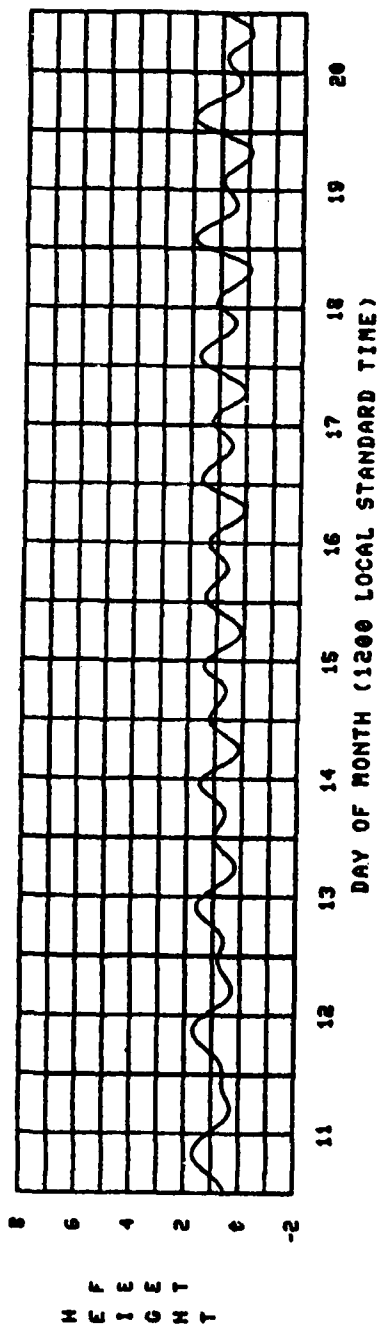
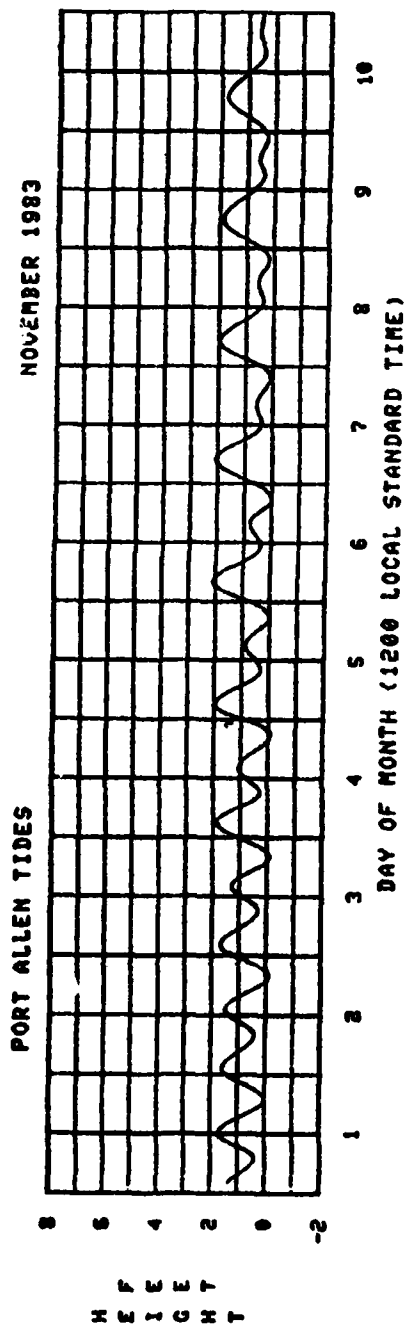


TABLE 40

PORT ALLEN TIDES

DECEMBER 1983

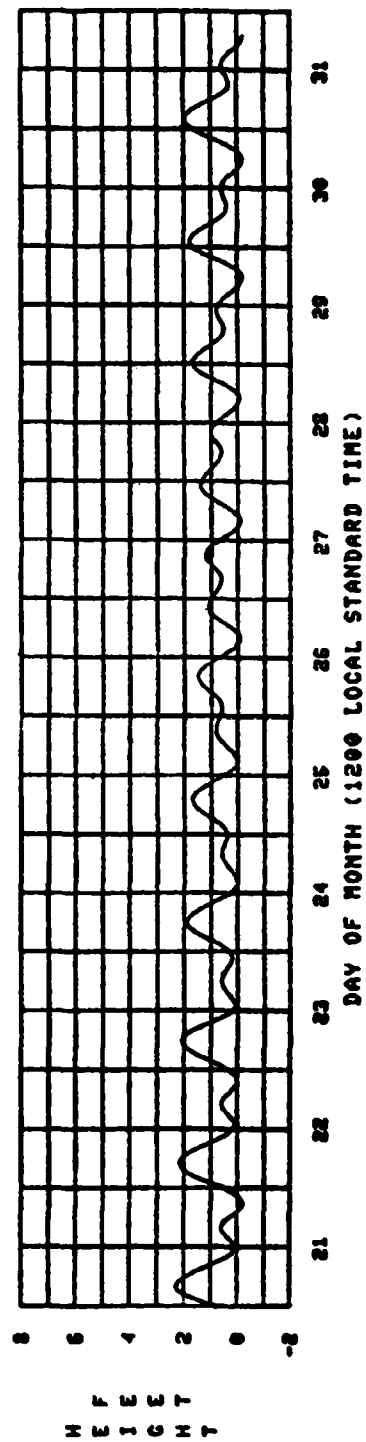
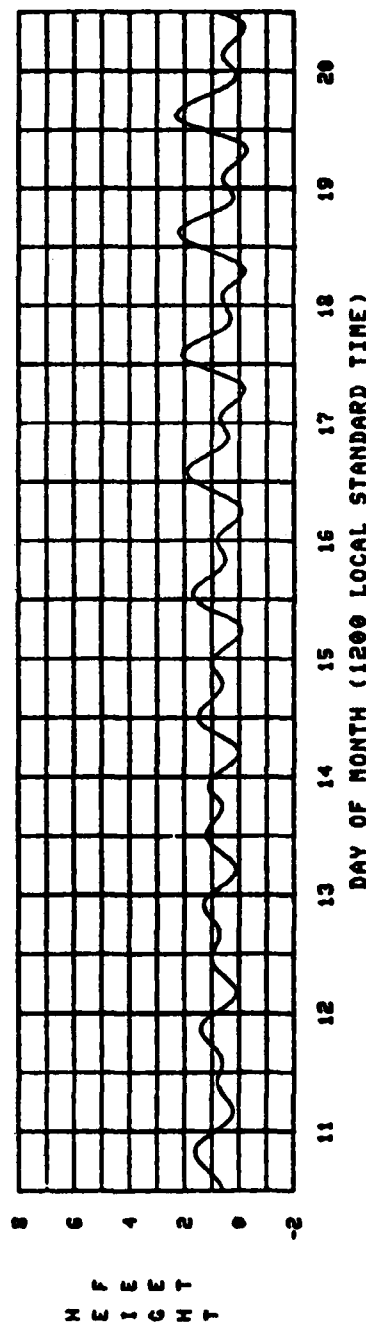
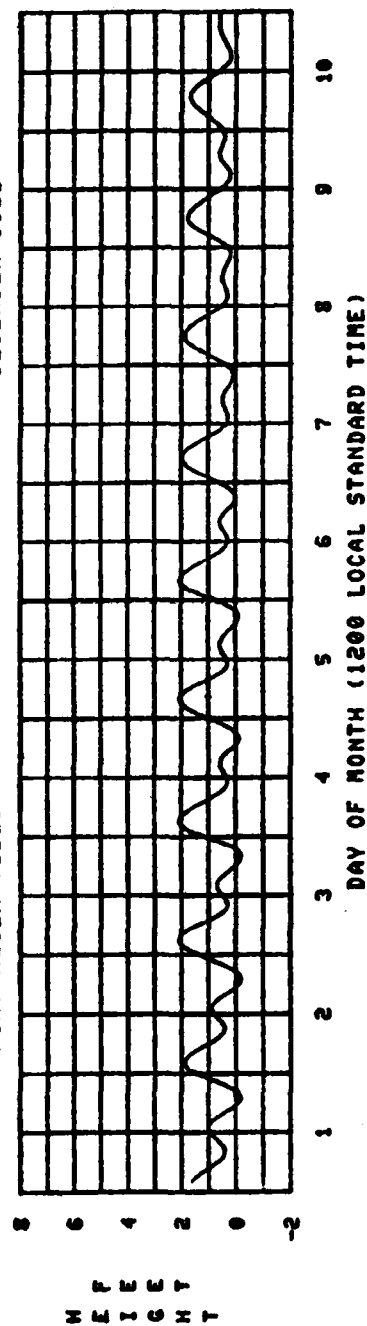
21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE BAY

DATE	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT	TIME AHST	HGT FT
1	0144	1.7	0822	.4	1305	1.0	1924	-.2
2	0223	1.9	0922	.4	1351	.9	1953	-.2
3	0300	2.1	1014	.3	1439	.7	2021	-.2
4	0337	2.1	1103	.3	1511	.6	2050	-.1
5	0412	2.1	1152	.3	1547	.6	2121	-.1
6	0450	2.1	1241	.3	1632	.6	2150	0.0
7	0527	2.0	1332	.3	1718	.5	2225	.1
8	0606	1.9	1418	.3	1821	.5	2300	.2
9	0649	1.8	1504	.2	1949	.6	----	----
10	0734	.4x	0731	1.7	1547	.2	2125	.6
11	0855	.6	0822	1.6	1626	.2	2243	.8
12	0238	.6	0911	1.4	1658	.1	----	----
13	2333	1.0x	0429	.7	1006	1.3	1727	.1
14	0015	1.2	0604	.6	1059	1.1	1754	0.0
15	0050	1.5	0719	.6	1147	1.0	1823	-.1
16	0127	1.7	0818	.5	1236	.8	1851	-.1
17	0201	1.9	0910	.4	1322	.7	1923	-.2
18	0239	2.1	0959	.3	1404	.6	1959	-.2
19	0318	2.2	1047	.2	1453	.6	2035	-.3
20	0357	2.3	1136	.1	1538	.6	2114	-.2
21	0439	2.3	1222	.1	1631	.6	2156	-.2
22	0524	2.2	1310	.1	1734	.6	2244	0.0
23	0609	2.1	1359	.1	1848	.6	----	----
24	2339	.2x	0659	1.9	1448	0.0	2014	.6
25	0052	.4	0748	1.7	1533	0.0	2143	.8
26	0224	.6	0840	1.5	1616	-.1	2259	1.1
27	0424	.6	0940	1.2	1658	-.1	----	----
28	2357	1.4x	0613	.6	1043	1.0	1735	-.1
29	0047	1.7	0742	.5	1144	.8	1813	-.2
30	0129	1.8	0845	.4	1243	.6	1849	-.2
31	0211	2.0	0939	.3	1335	.6	1924	-.2

x -- TIDE OCCURS ON PREVIOUS DATE.

PORT ALLEN TIDES

DECEMBER 1983



APPENDIX A

HEIGHT OF THE TIDE AT ANY TIME*

The height of the tide at times intermediate to the times of high and low water is needed on occasion, and may be computed by either numerical or graphical methods. One example of each method is presented here, using the predicted tides for a day at Point Mugu.

Problem: Given that the predicted times and heights of the tides are:

Time	Height	Time	Height	Time	Height	Time	Height
0039	4.9	0814	0.2	1510	3.1	1933	2.4

Find the height of the tide at 0300.

Numerical Method

The duration of fall is $08^h 14^m - 00^h 39^m = 7^h 35^m$.

The time after high water for which the height is required is $03^h 00^m - 00^h 39^m = 02^h 21^m$.

The range of tide is $4.9 - 0.2 = 4.7$ feet.

Entering table A-1 at the duration of fall of $7^h 40^m$, which is the nearest value to $7^h 35^m$, the nearest value on the horizontal line to $2^h 21^m$ is $2^h 18^m$ after high water. Following down this column to its intersection with a range of 4.5 feet which is the nearest tabular value to 4.7 feet, one obtains 0.9 which, being calculated from high water, must be subtracted from it. The approximate height at $03^h 00^m$ is, therefore, $4.9 - 0.9 = 4.0$ feet.

When the duration of rise or fall is greater than $10^h 40^m$, enter the table with one-half the given duration and with one-half the time from the nearest high or low water; but if the duration of rise or fall is less than 4 hours, enter the table with double the given duration and with double the time from the nearest high or low water.

*This information is adapted from table 3 of the data source for this publication (see page 1).

Table A-1. Height of the Tide at Any Time

Duration of rise or fall, see footnote.	Time from the nearest high water or low water															
	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.	A. m.
4 00	0 08	0 16	0 24	0 32	0 40	0 48	0 56	1 04	1 12	1 20	1 28	1 36	1 44	1 52	2 00	2 08
4 20	0 09	0 17	0 26	0 35	0 43	0 52	1 01	1 09	1 18	1 27	1 35	1 44	1 53	2 01	2 10	2 18
4 40	0 09	0 19	0 28	0 37	0 47	0 56	1 05	1 15	1 24	1 33	1 43	1 52	2 01	2 11	2 20	2 29
5 00	0 10	0 20	0 30	0 40	0 50	1 00	1 10	1 20	1 30	1 40	1 50	2 00	2 10	2 20	2 30	2 40
5 20	0 11	0 21	0 32	0 43	0 53	1 04	1 15	1 25	1 36	1 47	1 57	2 08	2 19	2 29	2 40	2 50
5 40	0 11	0 23	0 34	0 45	0 57	1 08	1 19	1 31	1 42	1 53	2 05	2 16	2 27	2 39	2 50	3 00
6 00	0 12	0 24	0 36	0 48	1 00	1 12	1 24	1 36	1 48	2 00	2 12	2 24	2 36	2 48	3 00	3 12
6 20	0 13	0 25	0 38	0 51	1 03	1 16	1 29	1 41	1 54	2 07	2 19	2 32	2 45	2 57	3 10	3 22
6 40	0 13	0 27	0 40	0 53	1 07	1 20	1 33	1 47	2 00	2 13	2 27	2 40	2 53	3 07	3 20	3 33
7 00	0 14	0 28	0 42	0 56	1 10	1 24	1 38	1 52	2 06	2 20	2 34	2 48	3 02	3 16	3 30	3 44
7 20	0 15	0 29	0 44	0 59	1 13	1 28	1 43	1 57	2 12	2 27	2 41	2 56	3 11	3 25	3 40	3 54
7 40	0 15	0 31	0 46	1 01	1 17	1 32	1 47	2 03	2 18	2 33	2 49	3 04	3 19	3 35	3 50	4 05
8 00	0 16	0 32	0 48	1 04	1 20	1 36	1 52	2 08	2 24	2 40	2 56	3 12	3 28	3 44	4 00	4 16
8 20	0 17	0 33	0 50	1 07	1 23	1 40	1 57	2 13	2 30	2 47	3 03	3 20	3 37	3 53	4 10	4 26
8 40	0 17	0 35	0 52	1 09	1 27	1 44	2 01	2 19	2 36	2 53	3 11	3 28	3 45	4 03	4 20	4 37
9 00	0 18	0 36	0 54	1 12	1 30	1 48	2 06	2 24	2 42	3 00	3 18	3 36	3 54	4 12	4 30	4 48
9 20	0 19	0 37	0 56	1 15	1 33	1 52	2 11	2 29	2 48	3 07	3 25	3 44	4 03	4 21	4 40	4 58
9 40	0 19	0 39	0 58	1 17	1 37	1 56	2 15	2 35	2 54	3 13	3 33	3 52	4 11	4 31	4 50	5 10
10 00	0 20	0 40	1 00	1 20	1 40	2 00	2 20	2 40	3 00	3 20	3 40	4 00	4 20	4 40	5 00	5 20
10 20	0 21	0 41	1 02	1 23	1 43	2 04	2 25	2 45	3 06	3 27	3 47	4 08	4 29	4 49	5 10	5 30
10 40	0 21	0 43	1 04	1 25	1 47	2 08	2 29	2 51	3 12	3 33	3 55	4 16	4 37	4 59	5 20	5 40

Range of tide, see footnote.	Correction to height															
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
1.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5
1.5	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8
2.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
2.5	0.0	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2
3.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.3	1.5
3.5	0.0	0.0	0.1	0.2	0.2	0.3	0.4	0.6	0.7	0.9	1.0	1.2	1.4	1.6	1.8	2.0
4.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.0	1.2	1.4	1.6	1.8	2.0	2.2
4.5	0.0	0.0	0.1	0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.3	1.6	1.8	2.0	2.2	2.5
5.0	0.0	0.1	0.1	0.2	0.3	0.5	0.6	0.8	1.0	1.2	1.5	1.7	2.0	2.2	2.5	2.8
5.5	0.0	0.1	0.1	0.2	0.4	0.5	0.7	0.9	1.1	1.4	1.6	1.9	2.2	2.5	2.8	3.0
6.0	0.0	0.1	0.1	0.3	0.4	0.6	0.8	1.0	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.2
6.5	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.1	1.3	1.6	1.9	2.2	2.6	2.9	3.2	3.5
7.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.4	1.8	2.1	2.4	2.8	3.1	3.5	3.8
7.5	0.0	0.1	0.2	0.3	0.5	0.7	1.0	1.2	1.5	1.9	2.2	2.6	3.0	3.4	3.8	4.0
8.0	0.0	0.1	0.2	0.3	0.5	0.8	1.0	1.3	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.2
8.5	0.0	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.1	2.5	2.9	3.4	3.8	4.2	4.5
9.0	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.5	1.9	2.2	2.7	3.1	3.6	4.0	4.5	4.8
9.5	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.6	2.0	2.4	2.8	3.3	3.8	4.3	4.8	5.0
10.0	0.0	0.1	0.2	0.4	0.7	1.0	1.3	1.7	2.1	2.5	3.0	3.5	4.0	4.5	5.0	5.2
10.5	0.0	0.1	0.3	0.5	0.7	1.0	1.3	1.7	2.2	2.6	3.1	3.6	4.2	4.7	5.2	5.5
11.0	0.0	0.1	0.3	0.5	0.7	1.1	1.4	1.8	2.3	2.8	3.3	3.8	4.4	4.9	5.5	5.8
11.5	0.0	0.1	0.3	0.5	0.8	1.1	1.5	1.9	2.4	2.9	3.4	4.0	4.6	5.1	5.8	6.0
12.0	0.0	0.1	0.3	0.5	0.8	1.1	1.5	2.0	2.5	3.0	3.6	4.1	4.8	5.4	6.0	6.2
12.5	0.0	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.6	3.1	3.7	4.3	5.0	5.6	6.2	6.5
13.0	0.0	0.1	0.3	0.6	0.9	1.2	1.7	2.2	2.7	3.2	3.9	4.5	5.1	5.8	6.5	6.8
13.5	0.0	0.1	0.3	0.6	0.9	1.3	1.7	2.2	2.8	3.4	4.0	4.7	5.3	6.0	6.8	7.0
14.0	0.0	0.2	0.3	0.6	0.9	1.3	1.8	2.3	2.9	3.5	4.2	4.8	5.5	6.3	7.0	7.2
14.5	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.4	3.0	3.6	4.3	5.0	5.7	6.5	7.2	7.5
15.0	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.5	3.1	3.8	4.4	5.2	5.9	6.7	7.5	7.8
15.5	0.0	0.2	0.4	0.7	1.0	1.5	2.0	2.6	3.2	3.9	4.6	5.4	6.1	6.9	7.8	8.0
16.0	0.0	0.2	0.4	0.7	1.1	1.5	2.1	2.6	3.3	4.0	4.7	5.5	6.3	7.2	8.0	8.2
16.5	0.0	0.2	0.4	0.7	1.1	1.6	2.1	2.7	3.4	4.1	4.9	5.7	6.5	7.4	8.2	8.5
17.0	0.0	0.2	0.4	0.7	1.1	1.6	2.2	2.8	3.5	4.2	5.0	5.9	6.7	7.6	8.5	8.8
17.5	0.0	0.2	0.4	0.8	1.2	1.7	2.2	2.9	3.6	4.4	5.2	6.0	6.9	7.8	8.8	9.0
18.0	0.0	0.2	0.4	0.8	1.2	1.7	2.3	3.0	3.7	4.5	5.3	6.2	7.1	8.1	9.0	9.2
18.5	0.1	0.2	0.5	0.8	1.2	1.8	2.4	3.1	3.8	4.6	5.5	6.4	7.3	8.3	9.2	9.5
19.0	0.1	0.2	0.5	0.8	1.3	1.8	2.4	3.1	3.9	4.8	5.6	6.6	7.5	8.5	9.5	9.8
19.5	0.1	0.2	0.5	0.8	1.3	1.9	2.5	3.2	4.0	4.9	5.8	6.7	7.7	8.7	9.8	10.0
20.0	0.1	0.2	0.5	0.9	1.3	1.9	2.6	3.3	4.1	5.0	5.9	6.9	7.9	9.0	10.0	

Obtain from the predictions the high water and low water, one of which is before and the other after the time for which the height is required. The difference between the times of occurrence of these tides is the duration of rise or fall, and the difference between their heights is the range of tide for the above table. Find the difference between the nearest high or low water and the time for which the height is required.

Enter the table with the duration of rise or fall, printed in heavy-faced type, which most nearly agrees with the actual value, and on that horizontal line find the time from the nearest high or low water which agrees most nearly with the corresponding actual difference. The correction sought is in the column directly below, on the line with the range of tide.

When the nearest tide is high water, subtract the correction.

When the nearest tide is low water, add the correction.

Graphical Method

If the height of the tide is required for a number of times on a certain day the full tide curve for the day may be obtained by the *one-quarter, one-tenth rule*. The procedure is as follows:

1. On cross-section paper plot the high and low water points in the order of their occurrence for the day, measuring time horizontally and height vertically. These are the basic points for the curve.
2. Draw light straight lines connecting the points representing successive high and low waters.
3. Divide each of these straight lines into four equal parts. The halfway point of each line gives another point for the curve.
4. At the quarter point adjacent to high water, draw a vertical line above the point, and at the quarter point adjacent to low water, draw a vertical line below the point, making the length of these lines equal to one-tenth of the range between the high and low waters used. The points marking the ends of these vertical lines give two additional intermediate points for the curve.
5. Draw a smooth curve through the points of high and low waters and the intermediate points, making the curve well rounded near high and low waters. This curve will approximate the actual tide curve and heights for any time of the day may be readily scaled from it. The resulting graph is shown in figure A-1.

CAUTION

Both methods presented are based on the assumption that the rise and fall conform to simple cosine curves. Therefore the heights obtained will be approximate. The roughness of approximation will vary as the tide curve differs from a cosine curve.

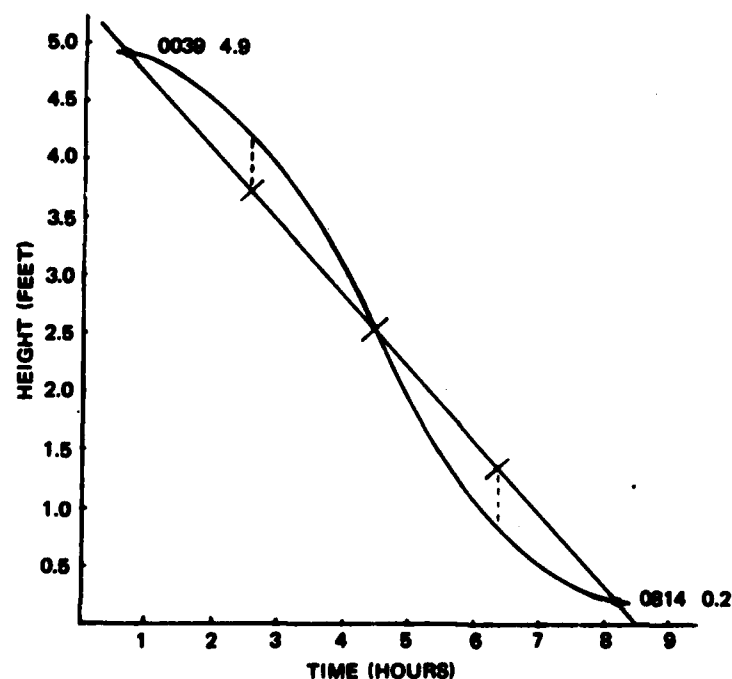


Figure A-1. Tidal Curve for Solution of the Problem.

APPENDIX B

EQUINOXES, SOLSTICES, AND LUNAR PHASES DURING 1983

The dates and times for Vernal and Autumnal Equinoxes and Summer and Winter Solstices during 1983 are listed in the table B-1. The 1983 dates and times for phases of the moon are given in table B-2. Both tables have been calculated for Point Mugu and San Nicolas Island. Two hours must be subtracted for times in the Barking Sands area.

Table B-1. Equinoxes and Solstices, 1983, Point Mugu and San Nicolas Island.

NOTE: All times are Pacific Standard Time; add 1 hour when Daylight Saving Time (PDT) is in effect. Subtract 2 hours for times in the Barking Sands area.

Vernal Equinox	20 March, 2039 PST	Beginning of Spring; day and night of equal length.
Summer Solstice	21 June, 1809 PST	Beginning of Summer; greatest duration of daylight.
Autumnal Equinox	23 September, 0842 PST	Beginning of Autumn; day and night of equal length.
Winter Solstice	22 December, 0230 PST	Beginning of Winter; greatest duration of darkness.

Table B-2. Lunar Phases, 1983, Point Mugu and San Nicolas Island.

NOTE: All times are Pacific Standard Time; add 1 hour when Daylight Saving Time (PDT) is in effect. Subtract 2 hours for times in the Barking Sands area.

Phase	January		February		March		April	
	Date	Time	Date	Time	Date	Time	Date	Time
Last Quarter	06	2000	04	1117	08	0616	06	0038
New Moon	13	2108	12	1632	14	0843	12	2358
First Quarter	21	2133	20	0832	21	1826	20	0068
Full Moon	28	1426	27	0058	28	1127	26	2231
Phase	May		June		July		August	
	Date	Time	Date	Time	Date	Time	Date	Time
Last Quarter	04	1943	03	1307	03	0412	02	1652
New Moon	12	1126	11	2037	10	0418	08	1118
First Quarter	19	0817	17	1146	16	1850	15	0447
Full Moon	26	1048	26	0032	24	1527	23	0859
Last Quarter	—	—	—	—	—	—	31	0322
Phase	September		October		November		December	
	Date	Time	Date	Time	Date	Time	Date	Time
New Moon	08	1836	08	0316	04	1421	04	0426
First Quarter	13	1824	13	1142	12	0749	12	0809
Full Moon	21	2236	21	1363	20	0428	19	1800
Last Quarter	29	1206	28	1937	27	0250	26	1052

Because the earth's period of revolution about the sun (365.24+ days) is not evenly divisible by the moon's period of revolution about the earth (27.32+ days), the dates and times of lunar phases, moonrise and moonset, and tidal data must be recomputed for each year. The following information, however, is based on geometrical relationships and holds true for all times:

1. The New Moon rises at sunrise, crosses the meridian at noon, and sets at sunset.
2. The First Quarter Moon rises at noon, crosses the meridian at sunset, and sets at midnight.
3. The Full Moon rises at sunset, crosses the meridian at midnight, and sets at sunrise.
4. The Last Quarter Moon rises at midnight, crosses the meridian at sunrise, and sets at noon.

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